Railway Age

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AMERICAN STEEL FOUNDRIES

Springs of Every Description

NEW YORK CHICAGO ST. LOUIS

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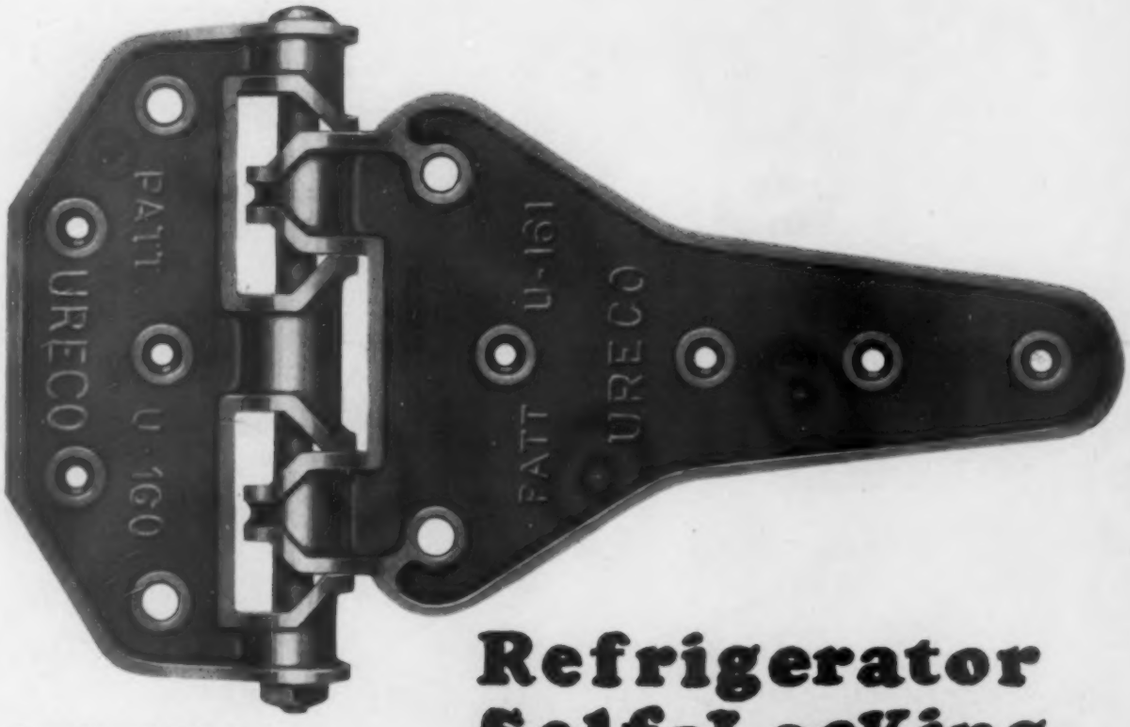

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EDITORIAL

Railway Age

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Speeding Up Freight Cars

"What is the oldest car in ——?" To an outsider this question appears as rather an odd one to be propounded by the president of a road or one of the operating officers when coming in contact with a local officer. The prompt reply of the local officers on the Central of Georgia to this question, however, indicates that they understand clearly what is intended. If a car has been delayed an unreasonable amount of time the explanation must clearly locate the responsibility. An organization trained to appreciate the import of this question and prepared to answer it promptly, will surely keep the cars moving and get a maximum use from the equipment.

The A. R. E. E. Convention

The fifteenth annual convention of the Association of Railway Electrical Engineers, held last week in Chicago, afforded abundant evidence that applications of electrical apparatus to the steam railroad field are increasing rapidly and also showed that the electrical men on the railroads are developing to meet their new responsibilities. In 1923 the exhibits shown at the convention occupied 4,600 square feet. This year the space was increased to 6,000 square feet with requests for 300 square feet of additional space. For the first time in the history of the organization a type of train control apparatus was shown indicating that one manufacturer at least has come to the realization that the motive power department must be familiar with the apparatus if it is to be used successfuly. Fourteen reports were presented; in spite of the effective mnner in which the chairman curtailed irrelevant discussion it was found necessary to hold special afternoon sessions on three of the four days to complete the work in hand. The increasing use of electrical apparatus will mean that the requirements of a railroad electrician will be much more exacting in the future. Fortunately those who are in charge of the work, as represented by the members of the A. R. E. E., are ready to cope with the new situations as they arise. The activities of these men have resulted in the development of new methods and new apparatus and these innovations have been adoted only when dependability and economy have been assured by test. The Association of Railway Electrical Engineers is a small body, but it is setting an example in achievement.

"Pelmanizing" Train Schedules

The British railways are gradually solving the problems incident to the amalgamation of all the lines into four large systems. One interesting situation which arose was the fact that subsequent to the consolidations most of the new systems found themselves with several main line terminal stations in London. The question at once arose: Should competitive service be offered from all these stations? The Southern Railway answered this question in the negative by assigning its express trains to one station and its locals to another. Other of the large systems, having under their control several times as many trains as were operated by any one of the companies before consolidation, have rearranged their time-tables to give better spacing between trains. Another step that has been taken is the "Pelmanizing" of schedules. This term is borrowed from a widely-advertised method for increasing mental efficiency by training the memory and by other means. Time-tables have, therefore, been "Pelmanized," i.e. made easy to remember, by arranging schedules so that all trains for Birmingham leave London at 10 minutes after the hour, trains for Bristol at 15 minutes past, trains for the West of England on the half hour and so on. Passengers are quick to learn these schedules and thus save themselves the asking and the railways the answering of innumerable inquiries. Probably the best-known service in the United States which is similarly "Pelmanized" is that between New York and Philadelphia—"Every hour on the hour." Could the system be extended and should it? These are only a few of the changes which consolidation has brought about in England, albeit of greater interest to the traveling public than many of a much more important and fundamental nature in the management of the railways. Certain of these changes have proved popular; others quite otherwise. The day mav come in this country when consolidations will occur at a rate to bring problems similar to those which the British railways are meeting and solving. If that day comes, the experience of Britain might well be studied as a guide for action here.

Costs in the Mechanical Department

Much interest has been taken recently in the use of the budget in some form as a means of maintaining some predetermined relationship between revenues and expenses. Several plans have been proposed or are in operation, but practically all alike are based on the assumption of a direct relationship between these two items month by month. In certain departments such a relationship may logically be assumed. Many items of transportation expense, for instance, vary closely in some well defined proportion to the volume of traffic being moved and, therefore, to the volume of revenue. In the case of the maintenance of equipment, however, no such clean-cut relationship exists and its assumption does not result in economy. The statement that repairs to equipment are needed at the time defects develop and the time to make repairs is when they are needed is too obviously true to require development. No one can prove, however, that defects develop in perfectly regular relationship to revenues and it is certainly obvious that control, based on revenue figures after the lapse of time required for their compilation, does not synchronize with the equipment conditions of the period covered by the figures whatever may be the relationship between the two. The ordinary method of budgetary control of equipment maintenance expenditures, therefore, seriously interferes with the maintenance of the one important relationship, which is the execution of repairs as defects develop. A policy which cannot maintain this relationship inevitably results in deferred maintenance in periods of depression, which cannot be caught up promptly when business resumes and which, equally inevitably, results in the ultimate necessity for doing more work and spending more money to cor-

rect the same defects than would be the case were the work done at the time it was needed, irrespective of the immediate revenue situation. A necessity for economy in a proper method of budgetary control is a control based on unit costs. It may seem obvious—but it is often overlooked—that if the unit costs are kept to the lowest possible figure true economy will be attained in ultimate total expenditures for equipment maintenance.

Will Habit or Reason Prevail?

The railways are now approaching the season of the year when they usually make drastic reductions in the forces engaged in the maintenance of their tracks and structures. There is no reason to believe that they will do other than follow this custom this year. The question may, therefore, be raised now as to the wisdom of this course. The Association of Railway Executives has appointed a committee to make a study of the stabilization of employment. The results of this study should do much to provide accurate information regarding the extent to which it is practical and economical to reduce the fluctuations which now prevail in maintenance work. This will mean much to the railways, for no single influence contributes more to the disorganization of maintenance of way work than that of the constant fluctuation in force. It is self-evident that no workman who has once been laid off will return to this industry if he can secure permanent work elsewhere. As a result the railways are required to build up their forces each spring largely with inexperienced men whom they lose by the time their training is completed. No manufacturing industry can develop skilled and efficient labor in this way. The railways are no exception. The practice of doing as much work as possible in the summer and as little in the winter is an outgrowth of the period when this country possessed a surplus of labor, a large part of which was content with seasonal work and returned to the railways from year to year. However, this condition no longer exists and most of the men who are laid off in the fall are lost to the railways permanently. It is evident that much of the work incident to the maintenance of railway tracks and structures is not of a character which permits its performance during the cold winter months. It is not so evident, however, that there is not a considerable amount of work which cannot be done to almost, if not equal, advantage at this season if it is properly organized in advance.

Can the Railways Compete?

THE RESIGNATION of C. M. Kittle as senior vice-president of the Illinois Central in order to accept the presidency of the great mail order house of Sears, Roebuck & Company is sure to attract much attention and cause much discussion. It raises a question which has been raised a good many times within recent years—viz., whether it is practicable for the railways to compete successfully for the services of men of ability when large concerns of other kinds seek to take them away from the railways.

Although still a young man, Mr. Kittle has made such a reputation for energy and ability it was practically assured that if he stayed in the railroad industry he would rise to one of the highest and most important positions in that field. We do not know what inducements Mr. Kittle was offered by Sears, Roebuck & Company, but intelligent people are familiar with the differences between the financial opportunities that can now be offered by a large private concern and by a large railroad. A large concern engaged in private business can not only pay larger salaries than regulating authorities and public opinion would approve of a railroad paying, but can give its officers opportunities for making profitable investments in its stock which no railroad can give. Furthermore, the managers of private business concerns are not subject to the harassments from demagogic attacks and regulatory restrictions which many railway officers find exasperating and discouraging. The American people have a strong tendency to measure a man's ability and achievements by the amount of wealth he accumulates. At the same time they adopt and enforce a large amount of legislation which largely prevents men from making money in proportion to the amount of service they render to the public. No limit is set to the profits that may be made or the salaries that may be paid by concerns that manufacture chewing gum or "flivvers," for example, but demagogues howl themselves hoarse if a railroad pays a dividend of 10 per cent, or gives its president a salary of fifty thousand dollars a year or more. The attitude of the public and public men regarding these matters is wrong and foolish. There is nothing the public needs more than efficient development and operation of its railroad systems. The railroads cannot be efficiently managed unless they can compete with other industries for the best brains in the country.

The railway business has fascinating qualities and many men choose to stay in it rather than accept offers that are financially more inviting in other fields. But the number of men of ability and ambition who are lured from the railroads into other fields is already too large and unless a sensible and business-like policy of regulation is followed, there is danger that it will increase. If government ownership should be adopted every man of ability in the business would get out of it as soon as he could and hardly any man of brains would enter it. The result would be an enormous decline in the efficiency with which the railroads would be managed.

A Transportation Budget

THE *Railway Age* has on a previous occasion pointed out that there are two kinds of budgets relating to operating expenses. One of these embodies the budget intended merely for purposes of checking performance. The other kind includes those budgets meant to assist in laying out a future program of work, particularly in the maintenance departments, so as to permit the railroad properly to meet expected future peaks or dips in the volume of traffic. Budgets of maintenance expenses may be either of one kind or the other. Those belonging in the second classification are presumably the more useful because, in theory at least, they combine both the function of helping check results in the present and past and that of planning for the future. Of late there has been more attention paid to budgets, particularly as concerns the results obtained, or rather that should be obtained. There is an increasing tendency on the part of those who have made a study of the subject to point out that the budget will be lacking in various of its presumed essentials unless means are available of forecasting future traffic needs. At least the problem has now reached that point where people are looking about for adequate or feasible methods of forecasting.

A budget of transportation department expenses is a very different thing from a budget of maintenance of way or maintenance of equipment expenses. It is customary in formulating a maintenance program to plan on the amount of new rail to be laid, the number of ties to be put in track, the yards of ballast to be applied, etc., or in the case of equipment, the number of locomotives to receive classified repairs, etc. Sometimes the budget will include these factors alone; sometimes it will cover the entire expected expenses of the department. At any rate, the idea is to plan ahead and at

least to formulate a program of future activity. In the case of transportation expenses, one cannot plan ahead so readily. It may be necessary in a budget covering all operating expenses, if such a budget is attempted, to include an estimated total of transportation expenses. The amounts set down for future transportation expenses in that case are to be considered as one of the essential parts of the entire program. Taken separately they will be expected to serve the purpose of insuring that the department manages its activity with economy. The planning feature will be secondary, because transportation expenses are current and are not so readily to be planned for the future. There is no factor comparable to those found in a program of maintenance work. Thus, it will be necessary to plan on a certain future fuel supply. Inasmuch as fuel does not appear in the transportation expenses until the fuel is delivered to the locomotives, the purchase of coal or oil to assure a future fuel supply is not a transportation budget matter but one to be covered by a budget relating to the service of supply.

The point is that transportation expenses vary currently with the variations in traffic. Every railroad man knows that they do not, however, vary directly or in equal amount with the variations in traffic. Thus, it is generally recognized that with, say, a 10 per cent decrease in traffic, it would take a remarkable operating officer to effect a 10 per cent decrease in his transportation expenses. This is not usually taken into consideration in the transportation budget. A superintendent will frequently be asked why he exceeded a certain budget allowance. He will explain that the increase in expenses was, let us say, 15 per cent, which was, of course, to have been expected because there was a 15 per cent increase in traffic. More careful study may develop that with a 15 per cent increase in traffic, good performance might require an increase in costs of but 8 or 10 per cent. Unless that is realized only half the benefit of the budget for purposes of management control is secured.

In this connection the *Railway Age* desires to call to the attention of its readers an article on another page of this issue entitled "A Plan for Budgeting Transportation Expenses." This has been written by J. E. Slater, assistant to the general manager of the New Haven, and describes a method recently put in operation on that road. In the plan described it is recognized that certain of the transportation expenses are fixed but that the others will vary with the traffic. It is further recognized that station expenses vary not necessarily with gross ton-miles, but with the tons of freight handled at these stations, that yard expenses vary with the cars handled, passenger train expenses with passenger train miles, freight train expenses with gross ton-miles, etc. Furthermore, these expenses do not vary directly with the variations in the particular units of traffic. Thus, on a particular division, station expenses may be found to vary only 80 per cent as much as the tons handled or freight train expenses only 75 per cent as much as gross ton-miles. The plan as worked out establishes a more exact standard of performance than would otherwise be possible and as such makes the transportation budget a more adequate measure of control. The article will be read with interest by operating men and we believe by railway accounting officers who, on most roads, have a great deal to do with the working out of budgets or budget material. That the plan has proved a success on the New Haven is evidenced by the interest that is shown in the current results by everybody concerned. It is axiomatic that the best results are to be obtained by things that encourage one's interest.

The method described by Mr. Slater is a logical development of the transportation budget plan as now used on most roads. There seems to be no reason why the idea is not applicable to any other railroad, provided proper care is taken to consider in the individual plan the particular problems that are met.

Heavier Loading of Cars Needed

THE RAILWAYS continue to make new records of efficiency of various kinds almost every month. The average number of cars per freight train in August was 43.2. Gross tons per train averaged 1,655. Both of these were new high records. The number of pounds of coal consumed per one thousand gross ton-miles in freight service was 131, and the number per passenger train car mile was 15.2. Both of these, also, were new records of the right kind.

Unfortunately, owing to no fault of railway managements, there is one respect in which the efficiency of freight train performance recently has not been as great as formerly, or as it should be. While in August gross tons per train exceeded all previous records, the number of revenue tons per train averaged only 746. This record was exceeded as long ago as in August, 1920, for which the figure was 762. The difference was due mainly to a difference in average tons per loaded car. The average number of revenue tons per loaded car in August, 1920, was 29.8, while in August, 1924, it was only 27.1. The tendency of the average load per car, not only not to increase, but actually to decline, is not a new one. The relatively small average load per car thus far during the present year is partly explained by the relatively small shipments of coal and other heavy loading commodities, but pertinent facts show that the problem of securing heavier loading is one that demands co-operative study and action by the railways and the shippers.

The average capacity of freight cars and their average weight is constantly increasing. This means that the railways are constantly hauling more dead weight per car, and unless there is a corresponding increase in loading the result is the incurring of operating expenses without the earning of corresponding revenues. Thus far in the year 1924 the average amount of revenue freight moved in each loaded car has been the smallest in proportion to the average capacity of cars since 1915. In fact, there have been only five years in the last twenty-one when the revenue load has averaged so small in proportion to car capacity.

The tendency of the average capacity of cars to increase faster in proportion than the average load prevailed for a long time before the war. In 1903 the average capacity of freight cars was 29.4 tons and the average revenue load per loaded car was 17.6 tons. The average revenue load was, therefore, 59.9 per cent of the average capacity. In 1915 the average capacity had increased to 39.7 and the average load to only 21 tons, the result being that the average load was only 53 per cent of the average capacity.

The large increase in freight business that followed the outbreak of the war in Europe resulted in car shortages. The railways urged shippers to load heavier, and in 1917 the average load was 59.5 per cent of the average capacity of cars. This was the best record since 1903. Under government operation of railroads the Railroad Administration applied pressure to shippers in various ways to secure heavier loading and in consequence in 1918 the record in this respect was the best ever made. The average capacity of cars in that year was 41.6 tons, the average revenue load per loaded car 26.9 tons and the ratio of the average paying load to the average capacity 64.7 per cent. The average load declined to 25.4 tons in 1919, was increased in 1920 almost to the record figure of 1918, and since then has declined again. In 1923, when the railways handled the largest freight business in history, the average capacity of cars was 43.7 tons, average tons per loaded car 25.2, and the ratio of the average revenue load to the average capacity 57.6 per cent. The average load of revenue freight per loaded car in the first eight months of the present year was only 24 tons. The average capacity of freight cars is now 44 tons. Therefore, in the first two-thirds of this year the

average revenue load per car was only about 54.8 of the average capacity per car.

The best way to indicate the importance of the decline in the average load per car which has occurred is to try to estimate what it has cost in operating expenses. The experience of 1918 proved that there is no really good reason why cars should not, on the average, be loaded to at least 64.7 per cent of their capacity. If this had been done in 1923 it would have resulted in a saving of more than three billion freight car miles. The average number of cars per train was 39.9. Therefore, assuming the same number of cars per train, the saving in freight train miles would have been about 78,900,000. The Interstate Commerce Commission compiles certain unit costs on a train mile basis and these amounted in 1923 to $1.74 per train mile. The saving in the expenses upon the basis of which these unit costs are computed would have exceeded 134 million dollars. The number of freight cars that would have had to be used, and in consequence the expenditures for freight car repairs would have been reduced, the estimated saving under this head being about $73,400,000. These estimated savings total more than 207 million dollars. The aggregate saving would have been much larger than this figure. For example; the reduction in the number of cars moved to handle the business would have caused a substantial reduction in the expense incurred in making up and breaking up trains, in switching cars to and from industries, etc. It is probably conservative to estimate that if the average load per loaded car had been relatively as much in 1923 as it was in 1918, the operating expenses of the railways would have been a quarter of a billion dollars less than they were.

Heavy loading of cars is the best single means of increasing the efficiency and economy of railway operation. It reduces all three of the large classes of expenses—transportation, maintenance of equipment and maintenance of way. It reduces the amount of investment that must be made in freight cars, locomotives, main tracks, terminals and shops and thereby curtails the increase that otherwise would take place in fixed charges.

On the suggestion of the Car Service Division of the American Railway Association there have been organized throughout the country Shippers' Regional Advisory boards. The members of these boards have co-operated wholeheartedly and effectively with the railways in promoting an improved distribution of cars and increased utilization of equipment. These boards, representing shippers of all classes, are admirably adapted to co-operating on behalf of the shippers with the railways in efforts to increase the loading of cars. When shippers have been urged in the past to load cars to capacity it has usually been done to prevent or reduce car shortages. Shippers, however, are interested in getting cheap railway service as well as adequate service. Now, the rates that must be charged for freight service depend mainly upon operating expenses, and operating expenses depend very largely upon the efficiency and economy of operation. Only by making operating expenses as low as practicable can it be made possible for the railways to give the shippers lower rates. The railways have made wonderful progress within the last four years in reducing operating expenses. They would have been able to have reduced them much more if the average freight car load had increased instead of declined. Twenty years ago the average capacity of each freight car exceeded the average revenue load carried in it by less than 12 tons. In 1923, the average capacity of each car exceeded the average revenue load carried in it by 18½ tons. In the first two-thirds of 1924 the average capacity of each car exceeded the average load carried in it by 20 tons. This great increase in the average unused capacity of each car, and the consequent increase in the dead weight being hauled by the railways, is costing the railways directly and the shippers of the country indirectly hundreds of millions of dollars a year which could be saved by heavier loading of cars.

The railways, however, are helpless to effect this saving without the co-operation of the shippers, because the shippers, not the railways, load the cars. Some good might be accomplished by appealing to the Interstate Commerce Commission to increase minimum car load weights, but the results that could be gained in this way would be negligible compared with what could be accomplished by voluntary co-operation between the shippers and the railways.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Accident Bulletin No. 92. Prepared by Bureau of Statistics, Interstate Commerce Commission. Covers collisions, derailments and other accidents on steam railroad for calendar year 1923. 103 p. Pub. by Government Printing Office, Washington. 5 cents.

Guide to China. Issued by Japanese Government Railways, Tokyo, Japan. 1924 edition, and first publication of the kind issued since the earthquake. 448 p. Maps, illustrations. Published by Japanese Government Railways, Tokyo, Japan.

Statistics of Railways of Class I, United States (1916-1923). Statistical Summary No. 4, of the Bureau of Railway Economics. 10 sheets. Issued by Bureau of Railway Economics, Washington, D. C.

Suggested Consolidation of the Railroads of the Eastern District into a Limited Number of Systems, by Samuel Rea. Statement of the president of the Pennsylvania before Interstate Commerce Commission, Oct. 11, 1924. 21 p. Printed by Allen, Lane & Scott, Philadelphia, Pa.

Walker of the Secret Service, by Melville Davisson Post. The author of this novel seems to have made a study of the best methods of holding up trains on lines equipped with block signals. Pub. by Appleton & Co., New York. $1.75.

Des Locomotiv-Ingenieurs Taschenbuch (*The Locomotive Engineer's Handbook*). A complete manual of European practice. Issued by Henschel & Son, Ltd., Cassel, Germany, in commemoration of the construction of their 20,000th locomotive. Pub. in German by Julius Springer, Berlin. Price, 5 marks.

Periodical Articles

A Man of Affairs Who Promotes Education. Comment on appointment of Howard Elliott, chairman of Northern Pacific, as chairman of Board of Overseers, Harvard. American Review of Reviews, Nov., 1924. p. 476.

The Billionaire Era. Part I. The Vanderbilts and Carnegie, by Arthur Train. Includes some discussion of railroad financial history. Forum, Nov., 1924. p. 616-628.

How Railroad and Industrial Stocks Acted Following the Last Six Presidential Elections. Chart and text. Magazine of Wall Street, Oct. 25, 1924, p. 994-995, 1056.

The Tax of Government Ownership. What Various Farmers Paid in 1923 *and What They Would Pay If Uncle Sam Ran the Railroads.* Country Gentleman, Oct. 25, 1924. p. 13, 33.

The Van Sweringens, by John W. Love. A history of their real-estate and railroad activities. American Review of Reviews, Nov., 1924, p. 498-504.

What is a Freight Rate—and Why? by Robert S. Henry. Nation's Business, Oct., 1924, p. 30-32.

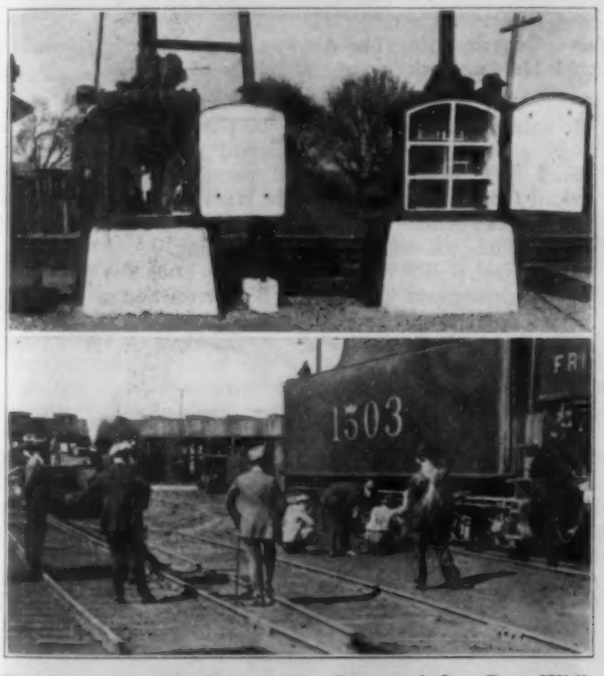
I. C. C. Inspects the Frisco's Train Control

Intermittent Inductive System Superimposed on D. C. Single Track Signaling Operates Satisfactorily

Passenger Locomotive Receiving Clear Indication

Track Magnet at Head Block Location

THE INSTALLATION of train control on 20 miles of single track, including 22 locomotives, on the St. Louis-San Francisco, was inspected officially by representatives of the Interstate Commerce Commission starting on October 15. This territory between Nichols, Mo., and Logan is a section of the main line division between Springfield, Mo., and Monett, which is one of the districts named in Order 13413 requiring train control. The inspection at this time is in accordance with the suggestion by the commission, in its announcement in April, that less than engine districts would be inspected on request of the carrier. P. W. Jones, engineer examiner, and Thomas B. Smith, engineer, both of the Bureau of Signals and Train Control Devices, represented the Interstate Commerce Commission on this inspection. On Wednesday, October 15, several of the engines were inspected in the terminal roundhouses. The next day signal and wayside train control apparatus was inspected while several days following were devoted to riding engines in regular service.



Signal and Wayside Control Was Inspected One Day, While a Second Day Was Devoted to Engine Equipment

Locomotive Equipment Installed and Maintained By Mechanical Forces

The control equipment of the National Safety Appliance Company's system, as installed on 14 passenger and 6 freight locomotives, consists primarily of the duplex receiving valve mounted under the tender and connected by a ¼ in. air line to the pneumatic stop valve connected in the train line and mounted in the cab beneath the engineman's brake valve. These devices together with a release cock and an air strainer constitute the engine equipment; there being no relays, batteries or wiring on the locomotive. Therefore, the operation of the locomotive apparatus is entirely magnetic and pneumatic.

The Frisco placed its first test installation of 6.3 miles of track with 3 engines equipped in service on April 16, 1923. Since that time several developments have been made in the engine apparatus. An air strainer incorporating baffle plates and hair cleaners is connected in the feed line to the duplex valve. The plunger type stop valve has been replaced by a diaphragm type valve. The decision of the commission issued on July 26, 1924, permits the use of the permissive feature in the simple train stop system and the Frisco has just recently installed permissive valves on two locomotives, the functioning of which will permit the engineman to acknowledge the stop indication of a signal and forestall the automatic brake application, providing the application has not already started.

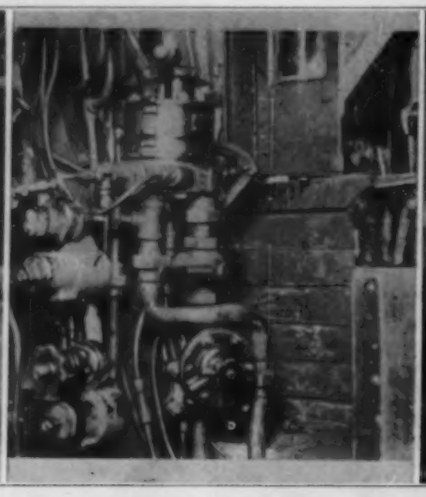
The locomotive equipment has been installed and maintained by regular roundhouse forces, there being no necessity to hold the locomotive out of regular service to handle this work. Included in the list of equipped engines are several of the latest mountain type oil-burning passenger locomotives that are on regular runs between St. Louis and Oklahoma City, 542 miles. The various equipped engines are turned in six different roundhouses. St. Louis, Mo., Monett, Mo., Ft. Smith, Ark., Sapulpa, Okla., and the two roundhouses at Springfield, Mo. So far the maintenance of en-

gine equipment has been handled at Springfield. The bar test is made at the station at Springfield on all equipped engines passing through but not entering the house.

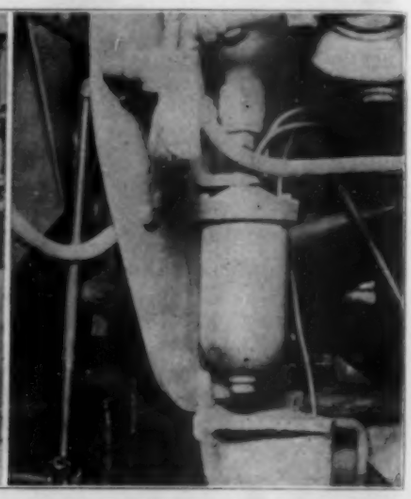
A record is kept of every inspection made of locomotive apparatus. A program requiring the thorough cleaning of the duplex valves and other parts at monthly intervals has been inaugurated. Up to the present no additional men, either in the mechanical or locomotive department, have been required for the maintenance of the train control system.

The locomotive equipment as used by the Frisco is standard and similar to that on the Southern Pacific, the Missouri Pacific and the other roads that have adopted the National system of intermittent inductive train control. However, the wayside control incorporated with the signaling has several unusual features, the majority of the control equipment being along the wayside rather than on the locomotive.

Release Valve With Three Pipe Connections Mounted Under Cab



Automatic Stop Valve Connected in Train Line Below Double Heading Cock



The Air Strainer Is Mounted Under the Rear of the Cab

Signal Department Responsible for the Majority of the Control Equipment

Single track three-position direct current automatic block signals were installed on this territory in 1911 and the wayside apparatus of the National Safety Appliance Company's intermittent inductive train control was superimposed on the existing signaling without changing the location of any signals. Track circuits at speed control locations were introduced and line changes made without interrupting the service of the automatic signals.

The train control system as in service on the Frisco incorporates speed control and absolute stop requirements at head-block signals and stop requirements only at intermediate signals. The same track magnets and track circuit controls are used for controlling traffic in both directions.

The fundamentals of the system are that a permanent track magnet, located between the rails as shown in the illustrations, is normaly active or in condition to stop a train. However, if the signal is in the proceed position when a train enters the approach, the electro-magnet coils of the track magnet are energized, which deflects the external field of the track magnet, thereby permitting the train to pass over the track unit without having the brakes applied automatically.

As these signals are operated by caustic soda primary battery, the regular signal operating battery is used also for the magnet when it is located at the signal.

Under normal operating conditions with signals at proceed, the train control system functions without any effort on the locomotive apparatus. However, if a train passes an intermediate automatic signal without observing the signal indication the brakes are applied automaticaly as the locomotive passes over the magnet at the signal. If a head-block signal is indicating stop, a brake application will be encountered at the magnet located braking distance from the signal.

If a head-block signal is at caution, either on account of the second block being occupied or on account of the train-order signal being at stop, it is required that the speed be brought down below 25 m.p.h. on passing the signal, otherwise a brake application is received at the signal. At the head-block locations a special permissive scheme is provided for the energization of the track magnet coils to avoid having the brakes applied automatically when passing over a track magnet when entering the siding.

The installation of the wayside apparatus was handled by signal department forces under the jurisdiction of I. H. Uhr, signal engineer. The locomotive apparatus was installed by roundhouse forces under the direction of A. H. Oelkers, chief mechanical engineer.

Electrical Laboratory at Franklin Union

Some Problems of Railroad Transportation*

Consolidations May Make Systems Too Large—Difficulties at Large Terminals—Necessary Principles

By Sir Henry W. Thornton
Chairman and President, Canadian National Railways

TRANSPORTATION is the first essential link in the chain of commerce and the exchange of commodities. The movement of persons and things within the frontiers of a state and between nation and nation marks the progress of civilization, and those states which have developed an adequate system of transport have correspondingly increased in opulence and power. Restriction of intercourse in primitive days, and a refusal to maintain communication with the outer world, were the fundamental characteristics of the savage. A philosopher has written: "Let us travel over the countries of the earth. Wherever there is no facility for passing from a town to a city, or from a village to a hamlet, there we may pronounce the people to be barbarians."

The existence or absence of transportation facilities has frequently affected the channels of development. The existence of such facilities is responsible for the location of many large centers of population and has directed the progress of industry. London itself owes its existence to a transportation factor as on the site of that city in very early days there existed the only practicable ford for many miles on the Thames. Here, travellers crossed the river, and there appeared inns and shops which in time grew from a few scattered huts to a city so that from the existence of a ford on the river Thames in the vicinity of London, there developed the great metropolis which now bears that name.

Water provided the earliest means of transportation, and what transportation existed by land was limited to precarious and difficult routes. The earliest civilization developed amongst those nations bordering the Mediterranean Sea and along such great rivers as the Nile and the Euphrates. That this development was assisted by the presence of a ready means of transportation by water cannot be denied. The first systematic attempt to provide a safe and easy means of land communication is seen in the road construction of the Roman Empire. This was the earliest attempt to provide effective land communication in Europe, and with but few exceptions nothing of the kind was undertaken on a comprehensive scale until the day of Napoleon, whose roads still exist and are in daily use. But what the ancient Romans sought to provide was not so much a transportation facility for industrial purposes as a means of meeting the military requirements of the empire in the expeditious movement of troops, and this principle has been even in modern times a factor in determining the state ownership of railways on the continent of Europe.

The fall of the Roman Empire and the political disintegration of Europe practically stopped highway development; and indeed during the dark or middle ages there was not much progress in any industrial pursuit. Such commerce as existed was limited mostly to the water, and in consequence there is seen the rise of such maritime nations as the Venetions, the Genoese and, later the Dutch, Portuguese and English. To a very large degree the position enjoyed by the British Empire has been due to the sagacity and courage of its people in the development of ocean transport and the wide-flung distribution of Great Britain's manufactured articles.

In the march of years there was an awakening of interest in literature and art, and in time manufacturing of various sorts rivaled the profession of arms which, in earlier days, was regarded as the only profession worthy of the name. The master craftsman appeared, and likewise guilds which protected and fostered the industry, but the real impetus came in the eighteenth century when various mechanical appliances were invented, permitting an approach to what is now known as mass production. As the output of factories increased, there came the demand for a cheaper form of mass transportation than that afforded by highways, and we have the prompt development of the canal system, with a still greater use of such natural waterways as existed. The canal, however, was slow and cumbersome; and a great impetus, not only to transport but also to industry, came with the adoption of steam as a form of energy and a propellant. At once industry burst the barriers which had throttled its development, and the whole world became its market.

Reasons for State Ownership

In some states railways were first constructed and administered by private companies; in others the provision of such facilities was regarded as an essential function of the government. It is interesting to note that, on the continent of Europe, which from time immemorial has almost continually been the battle-ground of warring nations, railways are largely in the hands of the state, while in England, which has not been subjected to a serious invasion since the day of William the Conqueror, railways are in private hands. In other words, the means of communication on the Continent of Europe were regarded as essential and necessary adjuncts to the military establishment. But whether the state owned and controlled its railways because of military necessities, or in the absence of such necessities it left their administration to private enterprise—there has been in Europe from the earliest days, the feeling that the importance of the functions of the railways, and their close and intimate effect upon the daily life of the individual, as well as their vital relationship to industry, justified the enforcement of such regulations as are essential for the protection of the community: and this theory has found expression in North America in various legislative enactments which are intended to protect the communities served by transportation interests.

To describe railway development on the North American continent would be to repeat a story with which all are familiar. Suffice it to say that, in all countries, the railway has been a necessary forerunner of national development. The opening of the United States and Canada to settlement would have been enormously retarded had it not been for the courage and enterprise of those who conceived and executed the great railway systems of those two countries. They were indeed the pioneers of empire, and played as great a part in the erection of the commercial and industrial edifice of the United States and Canada as any statesman who has earned the applause of his fellow countrymen. But there was this marked difference between the transportation problem in North America and that of Europe, which rendered the former much more difficult. With respect to Europe, an

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immediate traffic awaited the construction of the railway. There was no great problem of development, and the railway was not only assured of immediate traffic sufficient for its support but was likewise certain of that increment which came as each nation increased in population and wealth. In the case of North America, however, the construction of the railways was in advance of traffic and was essential for the purposes of development. There was attached to the railway problem not only all of the aspects peculiar to it, but the more difficult task of opening, settling and developing territories where the presence of man was unknown. This was in itself a problem of no mean magnitude so that those who were responsible for the early railways of the North American continent not only embarked upon adventures but undertook a task which required much courage and great sagacity. Whatever criticism may be levelled against the great railway systems of the North American continent, they cannot be accused of lack of progress in the development of such facilities and instruments as the rapidly growing traffic of the country has required. Light rails, insufficient ballast, severe curvature, heavy grades and uncomfortable and inadequate equipment have given way to vastly improved conditions. Heavy rails, a fine roadbed, powerful engines, steel passenger and freight equipment, great terminals, and the introduction of all of the appliances which science and invention have provided marks the progress of the industry. There may have been from time to time in the decades which have followed the civil war an insufficiency of cars, congested terminals and a retarding of freight movement; but it cannot be successfully maintained that the railways of the United States and Canada have not contributed their part in the development of their respective nations.

The history of the world has unfortunately been, in many of its aspects, a struggle between the rich and the poor, the powerful and the weak, the ruler and the ruled, and many are the changes which have taken place in the psychology of man and in his point of view with regard to his fellow men. Most of the conflict between railways on the one hand and governments on the other has been due to a failure on the part of those who administer the railways to recognize that conditions have changed. It is equally fair to say that many of the attempts to regulate railways and to prevent abuses have been unwise and ruthless. Both sides are open to criticism.

The Problem of Terminals

But we are more interested in the present and the future than in the past. Before proceeding further with a discussion of the economic aspect of this subject, however, I want to direct attention to a problem which is increasing in importance and in difficulty of solution. It is a comparatively simple matter to build a railway from one point to another of sufficient capacity and with enough equipment to move all of the traffic which can possibly be offered, but it is a much more difficult problem to provide adequate terminals for the distribution of that traffic upon its arrival in large centers of industry and population. In other words, there is only one serious technical problem in the transportation industry of the United States, and that is the terminal problem. From the point of view of passenger traffic, I seriously question the economy and the efficiency of the great and expensive passenger stations which adorn many of our large cities. At such locations serious points of congestion are created because there the passenger changes his form of transport from a subway, a street car or an automobile to the railway vehicle. All passengers are focused at this one point, with the result that at certain hours of the day an intolerable congestion is created. Moreover large terminals are expensive in both construction and administration. As each city increases in size, the malady becomes more aggravated until it becomes well nigh insufferable. The real solution, it seems to me, lies in the provision of a number of small passenger stations serving various parts of the business and shopping districts of our large cities, which would be reached by main line trains moving through subways. In this way the passenger load would be better distributed and large centers of congestion avoided. With respect to the elimination of freight congestion at terminals, the employment of motor trucks from freight houses located on the outskirts of cities and the absorption by railway companies of the collection and delivery of freight, will at least provide a measure of relief. To discuss before this audience the various considerations entering into the study of railway terminals, their construction and administration, would involve much more time than is at our disposal, but I want at least to make it clear that to my mind the greatest problem which confronts both railway companies and our large cities is the task of relieving the terminals. We find today in all civilized nations a more or less satisfactory form of transport, satisfactory at least in so far as ability may exist to move persons and goods readily from one place to another, and that all of this transport is conducted with comfort, and in many cases with luxury, in so far as the passenger is concerned, and speedily and effectively in the matter of freight services. Notwithstanding all of this, certainly in the United States, Great Britain, the Dominion of Canada and possibly elsewhere, there exists what is known as the "railway problem." Railways appear to be somewhat like governments in that they always excite a degree of contention amongst a certain number of the population. In England the various railway companies have been consolidated into four large systems, and this policy is still in an experimental stage. In Canada, somewhat more than twenty-two thousand miles of railway have been consolidated into a state-owned system known as the Canadian National Railways. This too, is a national experiment. In the United States there is in progress an argument as to whether your railways should or should not be combined into a certain number of large systems, and at least a proportion of your citizens think the nation would be better off if the railways were owned and administered by the government. Let me first explain how the existing situation in England and Canada came about.

When war was declared, the British government exercised its right under the law to control the railways of the United Kingdom.

When the British government relinquished control of the railways of the United Kingdom there at once arose a question of rates and fares, which in England as in most countries had been increased considerably during the war. It was necessary that some step be taken to effect a reduction, but that reduction could not take place in such a fashion as to bankrupt the railways and consequently some other expedient had to be found. Broadly speaking the principle was accepted that the gross revenues of the railways of England should be maintained at that level which would preserve to the railways as a whole, given efficient administration, substantially the same net earnings as they had in 1913, the first full year, as I have said prior to the war. The accomplishment of such a result with the one hundred and fifty odd separate companies which existed in England was obviously impossible, but the conclusion was ultimately reached that if the railway companies of England were amalgamated into four great systems not only would it be possible to arrive at the basis of rates and fares which has just been described but also that in time economies of administration and operation would permit the gradual lowering of charges. Accordingly the present railway act was passed and all the railways of England amalgamated into four great companies. It is significant that the Labor Party endorsed this proposal because in their judgment it was a necessary and an inevitable step towards nationalization. Whether this will come

about or not remains to be seen; but this is certain: if the present arrangement does not function satisfactorily, the only other step is state ownership, for to return the roads to their proprietorship of pre-amalgamation days, is unthinkable and impossible.

The Situation in Canada

The situation in Canada merits explanation, as it is generally misunderstood in the United States. There had been for a long time in the Dominion what were known as the Government Railways, consisting of the Intercolonial Railway (with the Prince Edward Island Railway) and the National Transcontinental Railway, the latter extending from Moncton, New Brunswick, to Winnipeg. The Intercolonial Railway had been built in fulfilment of the terms under which the provinces of New Brunswick, Nova Scotia and Prince Edward Island entered the Confederation; and the Transcontinental was a legacy which fell to the government as a result of the refusal of the Grand Trunk Railway Company to operate that line in accordance with the provisions of an agreement entered into with the government some years previously. These properties, as I have said, formed what was known as the old Canadian Government Railways. Some years back, Messrs. Mackenzie and Mann embarked upon the construction of the Canadian Northern Railway, practically a transcontinental system, and this in due time was completed. Somewhat simultaneously, the Grand Trunk Railway Company undertook the construction of the Grand Trunk Pacific Railway, extending from Winnipeg to Prince Rupert on the Pacific Coast. Both of these projects had been completed or approached completion, at the commencement of the European war. As a result of that disaster, and for other reasons more or less growing out of wartime conditions, the Canadian Northern Company found itself in serious financial difficulties, and the Grand Trunk Railway Company was obliged to confess its inability to continue the working of the Grand Trunk Pacific Railway. Under these circumstances, there seemed nothing for the government of Canada to do but take over the Canadian Northern and the Grand Trunk Pacific, combining them with the government railway system described above. To add to the complications of the situation, the parent Grand Trunk Railway System itself was in difficulty; and to make a long story short, in order to avoid receiverships and a chaotic transportation position, the government was obliged to take control of the Grand Trunk System, in addition to the other properties. Apart from the prevention of chaos in its transportation facilities, the Canadian government had a large stake in the railways I have just mentioned.

The National Transcontinental, which was intended to be the eastern section of the Grand Trunk Pacific, and which the government had built, had been estimated to cost $61,000,000, but by that time had cost $150,000,000. The western half of the road, which the Grand Trunk Pacific was constructing, had required much more than bond guarantees. Because of difficulties growing out of the guarantees the government had been obliged to absorb bonds aggregating $33,000,000, and, in addition, had thrice extended cash aid amounting to a total of $31,000,000. The Canadian Northern Railway, and the roads absorbed in that system, had received cash subsidies amounting to $32,000,000. In 1913, the government had acquired 70,000 shares of Canadian Northern common stock in consideration of certain of these subsidies, and in 1914 had acquired 330,000 additional shares in consideration of a $45,000,000 bond guarantee. In this way, the government became heavily involved in both enterprises.

It is important to note, however, that the acquisition of the properties which now constitute the Canadian National Railway System was brought about by circumstances which would have rendered any other course on the part of the government exceedingly difficult, if not impracticable, and at any rate, the fact remains that the people of Canada find themselves in possession of somewhat more than twenty-two thousand miles of railway, extending from the Atlantic to the Pacific, employing one hundred thousand men, and constituting two independent transcontinental railways which together represented, in point of mileage, the largest single railway system in the world.

From the foregoing it will be seen that the people of Canada acquired what is known as the Canadian National Railways because any other solution of their railway problem was doubtful. The financial position of the National system in some of its aspects has been used as an argument against the state ownership of railways, and in certain other aspects as an argument to the contrary. As a matter of fact the financial position of the Canadian National Railways is not in any sense due to their being a state-owned railway system. If anything, what unfavorable conditions there may be in the financial situation are the inheritances of private administration. The railway system does not earn its fixed charges, but what railway system of such magnitude would earn its fixed charges, if built to open the country in advance of development and settlement? The Canadian National Railways is a development proposition and was built for that purpose. Its problems are precisely the problems which confronted every railway in the western half of North America in their initial stages. It is the problem which will always confront every railway which is constructed in advance of traffic, and the history of the Canadian National Railways will be similar to that of the Canadian Pacific, the Southern Pacific, the Great Northern and all of those great enterprises which have reflected so much credit upon their projectors and subsequent administrators. It is fair to say, however, that the Canadian National Railways has fully demonstrated that, in so far as service and courtesy are concerned, the officers and men of a state-owned railway are just as loyal, alert and enthusiastic as those of any privately owned railway which has fallen under my observation.

Consolidations May Make Systems Too Large

In the United States dissatisfaction with the railway position seems to have increased in volume from about 1890 onwards. The railways, of their own volition, were struggling to relieve themselves of rebates and various other irregularities, but the government—both federal and state—took a hand, and one law succeeded another until the railways find themselves in their present state with two questions confronting them, one perhaps more imminent than the other.

The first is the proposal that the railways of the United States should be amalgamated into a number of large groups, something after the fashion of what has taken place in the United Kingdom. Personally, I question, from an administrative point of view, the wisdom of enlarging any of the great railway systems of the United States, such as the New York Central and the Pennsylvania, because I doubt the ability of any railway president efficiently and effectively to administer any larger mileage than that of the railways I have mentioned, having in mind their density of traffic. It is true the Canadian National Railway System comprises more than twenty-two thousand miles of line, but over a large portion of the property traffic is relatively sparse. Even at that, however, for the executive to cover the territory and keep in touch with various local and national interests almost passes the power of circulation be it ever so rapid. I think it was the late E. H. Harriman, (who you will all remember as perhaps the most sagacious master of transportation the century has seen,) who said that in his judgment about fifteen thousand miles of line, given reasonable

density of traffic, was all one president could look after effectively, and this was based largely on the mileage he could travel in three hundred working days of the year, assuming sufficient time in the office properly to look after the affairs of the system. There is also to be considered the maintenance of personal contact and acquaintance between the head of a large railway system and subordinate officers and men. The larger the system, the more difficult it is to maintain such a relationship, and to the degree in which it is diminished so will diminish loyalty, enthusiasm and efficiency. Railway consolidation in the United States, in my judgment, should extend merely to the mopping up of smaller lines in the immediate territory of each large trunk line where the welfare of the community will be served by so doing, and I deprecate the formation of systems so large as to pass beyond the administrative scope of the head of the system.

The other alternative which merits consideration, or at least with respect to which there is some argument, is that of state ownership. I have no intention of embarking upon any attempt to prove or disprove the merits of this proposition. That is something which must be left to the intelligence of the citizens of each nation. But I can, perhaps, from some experience in the railway industry, furnish certain principles which will assist in reaching a conclusion.

Those who favor the government ownership of railways generally advance something like the following arguments:

First.—That railways play such an important part in the life and welfare of the community that they cannot be safely entrusted to private ownership, lest discrimination, injustice and various irregularities develop.

Second.—That under state ownership rates and fares can be fixed upon that scale which will best promote development and progress.

Third.—That, broadly speaking, a higher degree of justice will be accorded to communities and the public in general than under private ownership.

Those who favor private ownership and operation of railways generally contend:

First.—That state owned and operated railways are inefficient, unprogressive and expensive, largely because of the impossibility of divorcing entirely the railway administration from the field of politics and the feeling that officers and employees working for the state have less reason for initiative and industry than those who are employed by private corporations.

Second.—That in a democracy, the more that is left to private initiative, the better.

Third.—That state ownership is a form of paternalism treading closely upon the heels of socialism.

Some Fundamental Principles

As a matter of fact, beyond the general and broad statement that transportation has such a vital effect upon the community that it should properly be in the hands of the state, and the argument that the interjection of politics in any railway system is bound to produce disaster, there is not much to be added either for or against government ownership, and the problem becomes entirely a matter of expediency in individual states. What may be necessary or desirable in one country may be quite the reverse in another, and some formula must be sought which will give expression to this principle.

There are three cardinal principles essential to the existence of any railway as a private enterprise:

(1) It must maintain solvency and meet its financial obligations.

(2) It must furnish adequate transportation without discrimination with respect to communities, at such rates and under such conditions as will permit the full economic development of the districts it serves.

(3) It must pay to its employees that wage which, under reasonable working conditions, will permit them to live in decency and comfort under sanitary conditions, and to educate and bring up their children as self-respecting members of society.

Let us elaborate a little the three principles which have just been announced.

Solvency, which is to say the ability to meet obligations, is the first factor in the life of any institution. The railway which finds itself insolvent and unable to perform its transportation obligations to the community, becomes a menace and a deterrent to progress and development. Therefore, obviously, solvency must be maintained. A railway which, though solvent, imposes rates and fares which throttle the industrial life of the community and produces discomfort amongst its citizens cannot be permitted to pursue such a course without increasing protest and the probability of exciting state intervention. Likewise a railway which, through discriminations or the imposition of unfair conditions, erects barriers to the full scope of the community, cannot continue such a course. If the wages paid and the working conditions imposed upon the employees are of such a character as to provoke strikes and continued interruptions of traffic, again, in the interests of the community, there must be some form of correction at the hands of the state. So that a material departure from any of these three principles by privately owned railway systems will probably excite a demand for state ownership and a departure from all three will in time inevitably produce that result.

Many of those who discuss the question of state versus private ownership of railways form their conclusions first, and subsequently develop their arguments. The subject is one which vitally affects the welfare of every nation. In no two nations are the circumstances identical. It is futile to argue that the policy of one nation is necessarily good for another. The only correct solution will be found in the development of a set of specifications to which the railway must conform if state ownership is to be eliminated, and it seems to me that the three principles I have already announced furnish those specifications. But the advocate of private ownership will say, "Will those specifications be more completely fulfilled if the state intervenes?" That depends very largely upon the intelligence of the electorate, and certainly it may be said that, whatever the circumstances may be, state ownership is only practicable in the event of its complete divorcement from influences other than those which have for their object the welfare of the community. In the event of general dissatisfaction with respect to privately owned systems, there will unquestionably be irresistible demands for state ownership on the theory that any change will be no worse and is likely to be for the better. This is not infrequently the convincing argument which influences the citizens of any country when they become dissatisfied with their political or economic position.

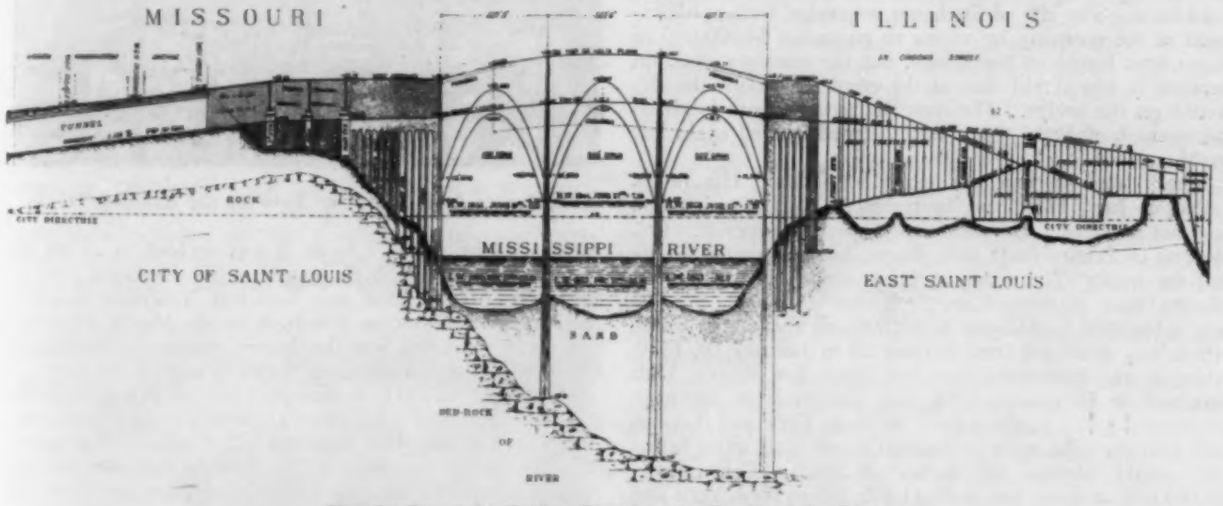
FREIGHT CLAIM AGENTS who are puzzled every day by mysterious concealed losses will be interested in the statement of the freight claim department of the Southern Pacific to the effect that when, recently, a box, purporting to contain kid gloves, arrived in San Francisco from Germany and was found to have been robbed of the gloves, a clew to the locality where the robbery occured was found by an analysis of lumps of coal which were discovered in the box. This coal proved to be not like any mined in this country; it resembled that mined in the famous Ruhr district in Germany. This, with other evidence, was reported to the shippers, and a part of the gloves were recovered by the police of Hamburg, Germany, confirming the chemist's opinion. Lumps of coal, packed in straw, had been placed in the box to fill up the space.

Eads Bridge Completes Fifty Years' Service*

Description of Famous Structure Shows Few Changes Made Since Opening—Early Problems Recounted

By C. E. Smith
Consulting Engineer, St. Louis, Mo.

THE EADS BRIDGE over the Mississippi river has served for over 50 years, having been opened for traffic July 4, 1874. Although some of its details have been altered and strengthened, the main frame of braced arch tubes is still intact and is carrying traffic far beyond the designs and expectations of the builders. The heaviest locomotives of that day weighed only 2,000 lb. per ft. Today the tracks are used by the locomotives weighing nearly 10,000 lb. per ft. The roadway, designed for light horse cars, is carrying a constant string of the heaviest interurban cars, automobiles and heavy automobile freight trucks. The bridge is used by over 100 passenger trains daily. About 600,000 passenger and freight cars and over 50,000 locomotives cross the bridge each year.



The Profile of the Bridge, Showing the Depth of the Piers

The problem of bridging the Mississippi river at St. Louis was more difficult than any other bridge problem undertaken up to that time. Just above St. Louis, the Missouri, the Mississippi and the Illinois rivers unite. The drainage area above St. Louis is nearly 800,000 square miles, nearly 90 times as large as the state of Massachusetts. At times of flood it is a boiling torrent which erodes its soft banks and beds on the slightest provocation. In ordinary flow about three feet of its bed flows with the river. In floods and during ice gorges the flow carries away the entire bed 100 ft. deep to bed rock, which is worn smooth from the erosion of the sand flowing with the current. At St. Louis the rise and fall is 45 ft. Ice sometimes packs and gorges to a depth of 20 ft.

The Bridge Cost Over Seven Million to Build

The main river bridge consists of two arch spans 502 ft. in the clear, and one central arch span 520 ft. in the clear, carried by two river piers and two shore abutments with masonry arch approaches for 225 ft. on each end.

Each span is formed by eight arch tubes, in four pairs of two, one above the other. The two tubes forming each vertical arch rib are 12 ft. apart and have pin joints 12 ft. apart with a diagonal system of braced eye bars between them. The four ribs in each span are cross braced. The two outer ribs are 16 ft. 6 in. center to center on each side and each pair carries one track. The two inner ribs are on 12 ft. centers. The railroad floor and the highway floor are carried by four lines of riveted vertical posts resting by forked plates on the pins in the four upper arch tubes.

The East St. Louis approach is a steel trestle with a 4 per cent grade for the highway and 1.5 per cent grade for the railroad. It consists of masonry walls and fill for the railroad tracks west about 1,000 ft. to Third street, with bridges over First and Second streets and the highway floor supported by the side walls of masonry. The entire bridge structure is about one mile in length. At Third street, St. Louis, the highway floor meets the street level; the railroad tracks extend in a tunnel west to Eighth street, turn 90 deg. and continue south in Eighth street a total distance of about one mile.

The bridge cost about $7,000,000 for construction, not including overhead and carrying charges during construction. The tunnel cost $1,250,000.

Early Difficulties

The site of the west abutment had for over 60 years been a steamboat wharf and was full of old iron, grate bars, fire brick, smokestacks, all parts of steamers. In the fire of 1849 when 29 steamers were destroyed, the burnt hulks of two were sunk here, one above the other. Later another steamer was sunk here. The bottom planks and sides were of oak 3 and 4 in. thick. Two—and partway three—sheet

*From a paper presented before the convention of the American Railway Bridge and Building Association at Kansas City, Mo., October 21 to 24, 1924.

pile dams were driven, cutting through the wrecks and rubbish by chisels. They struck a paddle wheel, cranks, engines, sawlogs, anchors, chains, all of which broke the cofferdam, and caused it to leak, making it difficult to unwater the bottom in 30 ft. of water. They apparently did not feel safe to seal the bottom with concrete as is done now, but laid the masonry on the bed rock.

The St. Louis Bridge Company was formed by St. Louis citizens in 1864. Later a rival company headed by a Chicagoan was organized. They fought until the spring of 1868. In the meantime Eads had started work. The rival company had gone to court to stop Eads from going ahead, and arranged for a convention of engineers who met at St. Louis and condemned Eads' plans. These things and the unexpected difficulties and the cost of going down only 30 ft. with the west abutment created distrust in the minds of the promoters and investors and money stopped coming, so work was suspended in the spring of 1868 and the cofferdam was flooded and filled with mud.

Eads was called upon for a complete report on how he ever expected to get the deep piers down. He rendered a detailed report dated May 1, 1868, which was widely quoted the world over. This report completely disarmed all his critics and brought him moral and financial support and confidence. The city of St. Louis responded to the predicament of the company by voting to guarantee $4,000,000 of 6 per cent bonds on the bridge, but the company declined because it was afraid that in the event of default the city would get the bridge. The company secured more funds on the strength of Eads' report and the work started again late in May, 1868.

These troubles were too much for Eads. His health failed in July, 1868, and he resigned, but the resignation was not accepted. He went to Europe to recuperate. Col. Roberts of Pennsylvania took charge, but apparently all life left the work. The money stopped coming in and all employees were discharged on September 1. Then $25,000 was subscribed to raise the west abutment above high water, which was continued from October 28 to January 10, 1869, when it was overtopped five feet above low water. Eads returned in December, 1868, but had to leave again in January, 1869. Bankers both in New York and London told him the piers must be brought above high water before they would advance any money on bonds. Consequently $3,000,000 in stock was sold, $1,800,000 in New York and $1,200,000 in St. Louis, and the books were closed as this was considered enough to finish the work.

The Origin of Pneumatic Caissons in America

Eads had originally proposed to sink his piers by open dredging inside cast iron cofferdams and sinking his masonry piers within them by floating down. But his European trips gave him the opportunity to see and learn of pneumatic foundations. In March, 1869, he had conferences with several noted French and British engineers. As his proposed St. Louis spans were about 200 ft. longer than any yet built in Europe, those engineers frowned on him, but convinced him that he should use compressed air. He returned in April, 1869, to change his plans. By June 1, he again had 1,000 men at work, which was increased to 1,500 by September 1. He had 24 boats, 37 engines, 31 pumps, 29 derricks, 40 travelers, 24 hydraulic hoists; everything in duplicate.

James Andrews, Pittsburgh, was given the contract for all the masonry. The U. S. Gunboat Milwaukee was cut up for plates for the caissons. The caisson for the east pier was launched from the marine ways at South St. Louis in October, 1869, and towed eight miles to the bridge. The river bed was reached in November, and bedrock on February 28, 1870, 95 ft. below the water surface. Filling the caisson was continued until April 13, when the cofferdam was overtopped, the water being 110 ft. 6 in. above the rock, and the air pressure 50 lb., a record for depth and pressure held by this bridge until quite recently. On May 27, 1870, the air chamber was filled. During the sinking of this pier it was cut off from land for 15 days by ice, but work went right on, the men living at the pier. The west pier was started on January 2, 1870, reached river bed on February 2, and bed rock April 1, and was filled May 8. This pier went down only 86 ft. below the surface of the water. During the summer of 1870 the masonry of the two river piers was built up several feet above high water.

The original plan did not contemplate sinking the east abutment to bed rock, but on piles 50 ft. below low water,

The Center Arch Seen from Between the Railroad Tracks

surrounded by riprap. Later it was decided to go all the way, 136 ft. below high water, at an increased cost of $175,000. The caisson was launched November 3, 1870, and reached bedrock at 109 ft. 8 in. on March 28, 1871. For many years this was the deepest pneumatic foundation. On April 30, the caisson and chambers were filled.

On March 8, 1871, a tornado damaged this pier to the extent of $50,000. All derricks, travelers and machinery were blown down. One man was killed and eight wounded. The air supply was stopped, the men brought out and the caisson filled with water. Freight and passenger cars and locomotives were blown away.

The piers and abutments are filled with limestone from Grafton, Ill., 50 miles away. A small part of the granite came from Richmond, Va., and part from Portland, Me. Of the latter, two vessels were sunk off the coast of Florida, seriously delaying the work. Later entirely satisfactory granite was discovered in Missouri, 100 miles away.

The piers are large enough to support any arch without the others. The dimensions and cost of substructure are as follows:

	Length	Width	Height	Below low water	
East abutment	83 ft.	70 ft.	192 ft. 9 in.	93 ft. 3 in.	$664,000
East pier	82 ft.	60 ft.	197 ft. 1 in.	86 ft. 2 in.	613,000
West pier	82 ft.	48 ft.	172 ft. 1 in.	61 ft. 2 in.	464,000
West abutment	94 ft.	62 ft.	112 ft. 8 in.	13 ft. 3 in.	339,000
West approach, stone					433,000
East approach, stone					267,000
Total 102,900 cu. yd.					$2,780,000

Great care was taken to avoid trouble due to compressed air, notwithstanding which much trouble was experienced. Of 600 men who worked under air, 100 were affected slightly, 119 others needed medical attention, 30 cases were serious and there were 14 deaths; 2 were paralyzed for life. The east pier, the deepest, had only 1 death and 28 cases needing medical attention. This was due to precautions as a result of experience at the others. An elevator was installed, all men were examined daily, beds and a hospital

were kept at the pier, men had lunch at the work, were furnished beef tea and rested one hour after work. The deepest men worked only 45 min.

Contractors Squirm Under Rigid Inspections

The contract for furnishing and erecting the steel was awarded to the Keystone Bridge Company of which Andrew Carnegie was vice-president. The iron and steel contracts were awarded to one of Carnegie's foundries and several others. The contract called for a grade of metal quite unusual in those days and for careful inspection and full size testing of many parts. This was taken lightly by the contractors but Eads held them rigidly to this requirement. As their contract prices did not cover such costs they sat back, did little or nothing and by delay, forced one adjustment after another.

Of the 48 skewbacks of forged iron 14 were made in New Jersey and 34 in Massachusetts. All were accepted. These required 112 steel anchor bolts, 34 ft. long, 5¾ in. diameter, upset to 6½ in. at the ends. These were tested full size. Although specimens of the steel broke at 100,000 lb. per sq. in., the full bolts broke at about 30,000. A new annealing furnace was built and at 38,000 lb. per sq. in. the machine broke. In July, 1871, after six months work, all the bolts, $33,600 worth, were rejected. A great deal of damage had been done to the testing machine. Although the bridge masonry was waiting for these anchor bolts Eads abandoned the steel bolts and ordered wrought iron. The first seven bolts were tested and accepted August 18, 1871, and the rest followed rapidly. This delay held back the masonry in the summer of 1871.

Each arch tube, of which there were 48, was composed of over 40 sections of tubing placed end to end and connected by couplings. Each tube consisted of a steel shell ¼ in. thick 18 in. outside diameter formed from a flat plate rolled to a cylinder and butt riveted; in this shell were placed six staves 9-in. wide and 1-in. to 2-in. thick depending on the stress. The last stave was forced in place under

A View of the Bridge, Looking East

heavy pressure. The ends of the staves project beyond the ends of the steel shell and are grooved to engage opposite grooves on the inside of couplings. The ends of the staves are planed for bearing and one-half a pin hole drilled for pins about 6-in. in diameter. The couplings are made in half circles and bolted through the flanges at the edges. The pin holes go through flat sides of these couplings, which fit inside the forked eye—ends of the braced eye bar diagonal web members. The diagonal eye bars are in pairs latticed across, about 13 in. wide by 1¾ in. thick and 15 ft. long. The heads are upset to 20 in. diameter by 2⅜ in. thick.

The envelope or shell plates had to be planed on both edges before riveting and then calked. The elastic limit required 40,000 lb., and the ultimate strength 90,000 lb. per sq. in. Chrome steel was tried for these but proved too brittle. A trade metal called "Homogeneous Steel" was finally used having a 40,000-lb. elastic limit, 90,000-lb. ultimate strength, yet so ductile that a ¾-in. bolt would bend double on itself cold without cracking.

The staves were required to be of crucible steel which cost 15 cents per lb. Trouble was experienced because crucible steel had never before been made into bars anywhere near the size required here. The steel makers' facilities were inadequate; the workmen unskilled; and the foremen without experience in working such large pieces. Chrome steel was experimented with after crucible steel was found too soft. Six months were consumed in learning how to roll a stave. After long delay a new metallurgist was brought over from England to supervise the mixing and melting of the chrome steel. There was no further trouble. The specimens tested up to 119,000 to 162 lb. per sq. in. By February rolling staves was easy but it had cost time and money to learn. The first stave was rolled on May 1, 1871. The first satisfactory stave was accepted on March 1, 1872. Then they became so uniform that only one in three, then 1 in 10 were tested. The ultimate strength was about 120,000 lb., the elastic limit about 50,000 lb.

There was still more delay and controversy to get the ultimate strength of the diagonal bars up to 60,000 lb. Those tested broke at 50,000 to 55,000. The eye bars tested for the St. Charles bridge ran up to 60,000 lb. but Carnegie refused to make it because it cost more. In December, 1871, Eads accepted the 50,000 steel, reduced the price and increased the thickness.

A total of 1,012 tube couplings were called for of rolled steel, elastic limit 40,000 lb.; ultimate strength 90,000 lb. The order was placed October 24, 1870. Trouble was experienced from the beginning and Eads agreed to accept steel of 80,000 lb. ultimate strength. The first ingots were cast for these on November 25, 1871, but they cracked in rolling. Further experiments were made and finally, beginning January 2, 1873, acceptable couplings were turned out, steel for the lower castings and wrought iron for the upper castings.

By reason of the various changes in steel and iron requirements only 643 tons out of a total of 6,141 tons remained at the original prices. By reason of these changes and the Keystone Bridge Company's growing fear of the erection, Andrew Carnegie caused the bridge company to get a report in 1872 from James Laurie, consulting engineer, but nothing much came of it.

The Keystone Bridge Company had contracted to erect the superstructure complete within 17 months if the piers were completed by March 1, 1871. It was to receive $104,000 for erection, $36,000 for painting and $36,000 for testing materials. The bridge company assumed all risk of erection. The date was later extended to May 15, 1872. In November, 1872, on account of Eads accepting couplings with an ultimate strength of 80,000 lb. per sq. in., the bridge company tried to throw the erection responsibility on the bridge company. This dispute resulted in a new erection contract on March 5, 1873, in which extra erection cables were agreed upon at an extra cost of $30,000. On August 20, 1873, Eads left for Europe again for his health and five days later the Keystone Bridge Company made trouble. Further extra payments were agreed on to insure that the erection would proceed simultaneously at six points.

Arches Sensitive to Temperature

The arches were erected without any falsework in the river by balancing the progress and cantilevering out from timber towers on the piers and anchoring back on the abutments. Elaborate arrangements were made with jacks in the towers to counteract temperature changes in the erection

cables and arches. The two halves of the west span came within ½ in. of the length, but the opening was too short to permit the full tube to be put in. After waiting for five days for cooler weather (in September) and packing the arch with ice to cause it to shrink, adjustable screw sections of tubes that were on hand for this emergency were put in just in time to save a loan of $500,000 in London, contingent on closing the first span on September 19, 1873. These sections were then screwed out, a little at a time, the lower tube at night and the upper tube in the daytime until the right length was obtained when the diagonals and pins were put in. No additional trouble was experienced with the other arches. Another loan was to expire if the second span was not closed by December 18. It was closed on time.

The sensitiveness of these arches to temperature stresses is shown by the change of 1 in. for each 25 deg. in the opening before the last section was inserted. Under certain conditions the temperature stresses in the tubes may exceed the load stresses. There may even be tension in one or the other ring under certain conditions. Under these conditions it can be seen readily that any section of tube can be taken out. Before the erection cables had been released an extremely cold snap caused one arch to shrink and break two tubes. They were replaced by seven men in 18 hours and the cables taken down.

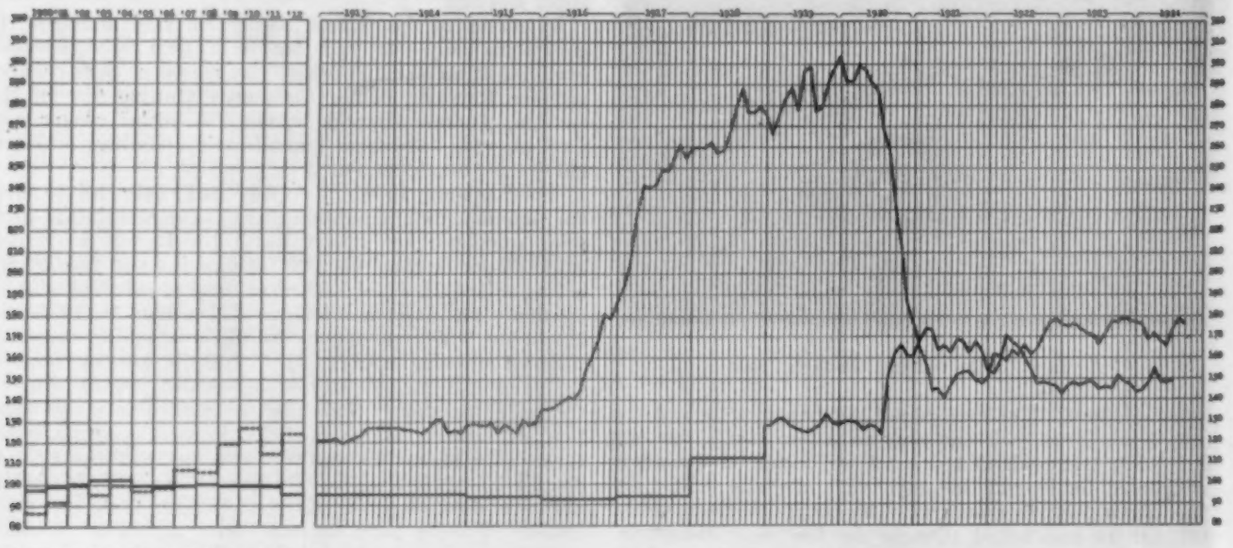
The completion of the upper superstructure, floors and approaches proceeded rapidly without any special trouble and on April 15, 1874, the upper roadway was finished. On July 2 a public test was made with 14-50-ton locomotives on one track and 7 on each track. One engineer lost his nerve at the last moment and reversed his engine. He was dragged out with his wheels turning backward. The deflections of the various arch ribs varied from 1 in. to 4 in. The bridge was formally opened on July 4, 1874, when St. Louis staged a parade 15 miles in length in honor of the event.

The river piers and abutments, the masonry approaches and the masonry footings of the east approach stand today as built and have never required any unusual expense for maintenance. The main arch ribs and braced diagonal web system are the same as when built, except that about 20 tubes out of a total of about 1,000 have been replaced due to corrosion. The vertical supports of the two floors are the same as when built, but slightly reinforced. The rod cross bracing between the arch ribs has been taken out and replaced by riveted stiff bracing. The railroad floor beams and stringers have been replaced and are now having plates added to strengthen them to carry the heaviest modern locomotives. The highway floor beams are the same as when built, except for replacements due to corrosion and heavier loadings. The timber joists and iron beams that carried the highway floor between the masonry walls on the west approach were replaced two years ago with a reinforced concrete top. The east approach, formerly of Phoenix columns, has been entirely replaced.

The net cost of this bridge to the railroads is about $600,000 per year, about $1 per car. The remainder of the cost is provided by revenues from the upper roadway, about $200,000 from electric cars and an equal amount from vehicles and pedestrians.

Station Named After Dean of Conductors

IN THE LAST EMPLOYEES' TIMETABLE of the Maryland division of the Pennsylvania, the reader will notice an entire absence of information concerning telegraph calls; a significant indication of the fact that on that division the telephone has completely superseded the Morse key and sounder as a means of transmitting train orders. In communicating by voice, it is, of course, as easy to speak the whole word as to use initials or arbitrary letters. All of the



Prepared by Bureau of Railway Economics

Relative Receipts per Ton-Mile, Compared with Relative Wholesale prices of Farm Products

(Average 10 Years 1900-1909 = 100)

Full Line—Relative receipts per ton-mile obtained by converting actual receipts per ton-mile, as reported by the Interstate Commerce Commission, into index numbers based upon the average of the ten years, 1900-1909. Receipts per ton-mile, for the years 1900 to 1915, are reported by the Interstate Commerce Commission on a fiscal year basis (years ending June 30), and for subsequent years on a calendar basis (years ending December 31). In order to have the averages on a comparable basis throughout, the fiscal year returns were converted to a calendar year basis by the method indicated in the following example: The calendar year figure for 1900 was obtained by taking an average of the two fiscal years 1900 and 1901. Monthly average receipts per ton-mile are not available prior to March, 1919.

Dotted Line—Relative prices of farm products have been obtained by converting the wholesale prices of farm products reported by the Bureau of Labor Statistics, U. S. Department of Labor, into index numbers based upon the average of the ten years 1900-1909.

numerous junctions and block signal towers on this division heretofore known by the letters used for their telegraph calls, have now been assigned names; so that, for example, an order to "run HA to WA" will now read "run Landlith to West Yard." Six towers in the vicinity of Wilmington, Del., have been renamed as shown in the tabulation in the next column.

Conductor Ragan at Ragan Station, Delaware

Towers at or near passenger stations are in most cases designated by the name of the town. Two towers, "PJ," three miles south of Wilmington, and "NY," 12 miles south of Wilmington, have been named in honor of employees: "PJ" for Lewis W. Ragan, passenger conductor, and "NY" for A. C. Davis, who is now assistant chief of motive power but who formerly for many years served on this division.

Old name	New name
HA	Landlith
WA	West Yard
PJ	Ragan
CU	Bridge Three
GH	Lane
PG	Ward.

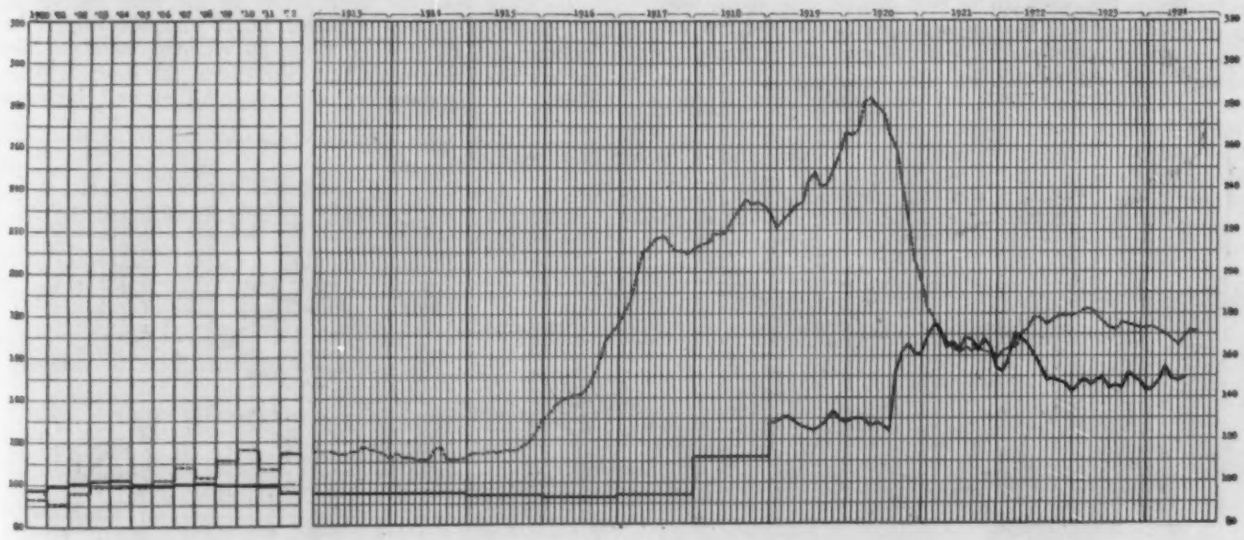
Ragan station is at the junction of the main line with the Shellpot branch, and in the illustration Conductor Ragan is seen standing on the stairway of the tower, his train having been stopped there to receive an order. Mr. Ragan has been a passenger conductor for 43 years and in the service of the division 50 years.

New Carloading Record

WASHINGTON, D. C.

MORE CARS WERE LOADED with revenue freight during the week ended on October 18 than during any one week before. The total for the week was 1,102,336 cars. This exceeded by 4,843 the previous high record established during the week of September 29, 1923, when the total was 1,097,493 cars. This also exceeded by 13,874 cars the loading for the preceding week this year which had marked the previous peak for 1924.

Not only does this figure, 1,102,336 cars, represent the highest car loading for any single week in the history of the American railroads but the new high record was accomplished without car shortage, congestion or other transporta-



Prepared by Bureau of Railway Economics

Relative Receipts per Ton-Mile, Compared with Relative Wholesale Prices of All Commodities

(Average 10 Years 1900-1909 = 100)

Full Line—Relative receipts per ton-mile obtained by converting actual receipts per ton-mile, as reported by the Interstate Commerce Commission, into index numbers based upon the average of the ten years, 1900-1909. Receipts per ton-mile, for the years 1900 to 1915, are reported by the Interstate Commerce Commission on a fiscal year basis (years ending June 30), and for subsequent years on a calendar basis (years ending December 31). In order to have the averages on a comparable basis throughout, the fiscal year returns were converted to a calendar year basis by the method indicated in the following example: The calendar year figure for 1900 was obtained by taking an average of the two fiscal years 1900 and 1901. Monthly average receipts per ton-mile are not available prior to March, 1919.

Dotted Line—Relative prices of all commodities have been obtained by converting the wholesale prices of all commodities reported by the Bureau of Labor Statistics, U. S. Department of Labor, into index numbers based upon the average of the ten years 1900-1909.

tion disability. Today there are about 100,000 surplus freight cars in good repair and immediately available for service when needed while the railroads have approximately 5,400 serviceable locomotives in storage, about twice as many as they had at this time last year.

"There are three reasons why the railroads were able to meet this record freight movement during the week of October 18 without transportation difficulties," according to a statement issued by the Car Service Division of the American Railway Association. The reasons are:

1. Additions to the railroad plant and improvement in operation brought about through large financial expenditures.

2. Complete correlation and co-operation between all individual carriers through the Car Service Division of the American Railway Association in car distribution.

3. Better understanding and co-operation between the railroads and the shipping public through the Regional Shippers' Advisory Boards now located in all parts of the country, with a membership representing all phases of agricultural and industrial production, including the smallest farmer and the largest industry.

"Too much credit cannot be given to the accomplishments of the Regional Advisory Board," the statement continued, "in anticipating the transportation needs for each operating district, thereby giving the Car Service Division a definite measure of the transportation requirements in all territories in advance of actual demand. Also the carrying out of the Car Service rules by shippers in general, making it possible to put in the west the cars required in the west for agricultural products. Record breaking grain crops have been moved without a single reported car shortage from the Western States. The California perishable producers heretofore have been confronted with periodical car shortages but this year there has been no shortage of refrigerator car equipment."

The railroads during the week of October 18 also established three other new high records, as follows:

More cars were loaded with miscellaneous freight during the week than ever before, the total being 418,234 cars. This was an increase of 12,798 cars above the previous high record established during the week of September 27.

A total of 43,092 cars was loaded with livestock during the week, the greatest number for any one week this year, exceeding by 1,460 cars the previous peak established during the week of October 11, 1924.

The railroads on Wednesday, October 15, moved a total of 1,030,211 freight cars, including both loaded and empties. This was the greatest number ever handled on any single day on record, exceeding by 783 cars the previous high record established on October 17, 1923.

The total loading of all commodities for the week of October 18 was an increase of 29,241 cars over the corresponding week of last year while it also was an increase of 112,447 cars above the corresponding week in 1922.

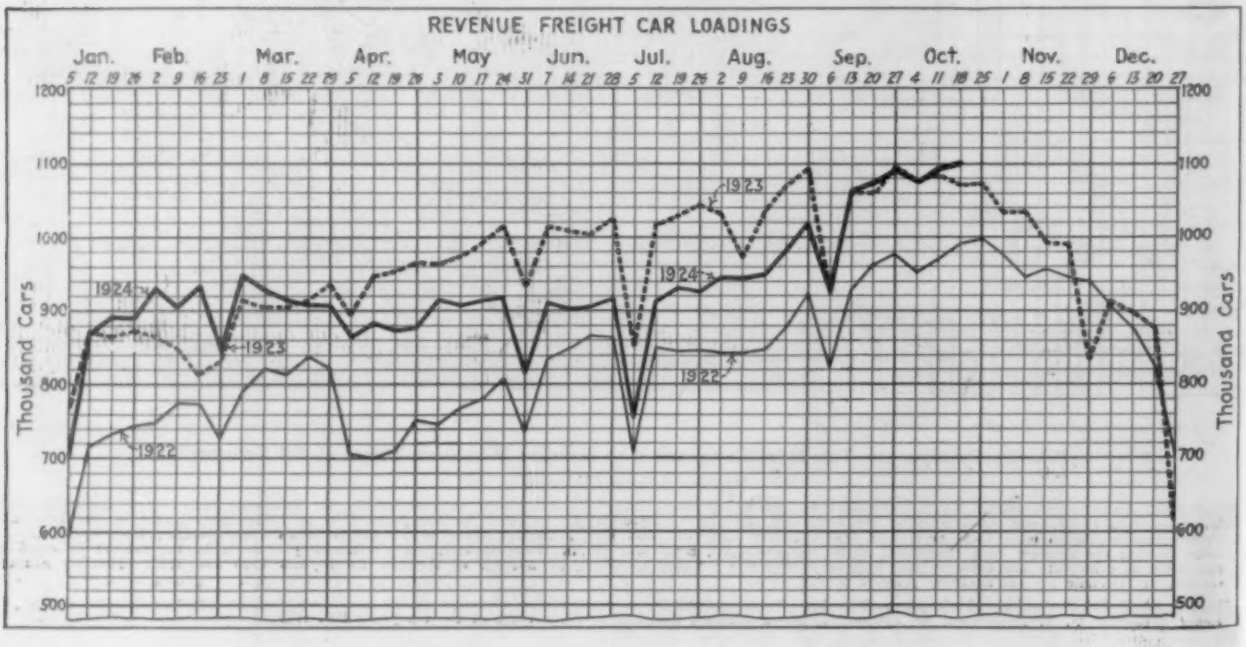
Miscellaneous freight loading amounted to 418,234 cars, the highest for any one week on record and an increase of 18,017 cars over the preceding week. This also was an increase of 26,757 cars above the corresponding week in 1923 and 62,188 cars above the corresponding week in 1922.

Livestock loading for the week totaled 43,092 cars, an increase of 1,460 cars above the week before and the highest for any one week this year. Compared with the corresponding week last year it was an increase of 705 cars and with the corresponding week in 1922, an increase of 2,678 cars. Livestock loading in the western districts alone for the week of October 18 totaled 33,761 cars, an increase of 2,654 cars compared with the same week last year.

Loading of grain and grain products totaled 69,998 cars, the second largest loading for any one week on record, having only been exceeded during the week of October 4, this year, when the total was 71,134 cars. Grain and grain products loading for the week of October 18 was an increase of 7,416 cars above the week before and 21,235 cars above the same week last year. In the western districts alone the total was 51,502 cars, 18,810 cars above the corresponding period last year.

Coal loading totaled 191,449 cars, a decrease of 670 cars under the previous week and 1,415 cars below the corresponding week in 1923. It also was a decrease of 2,070 cars below the corresponding week in 1922.

Increases over the week before in the total loading of all commodities were reported in all districts except the Eastern and Pocahontas, while all reported increases over the corresponding week last year except the Eastern, Allegheny and Northwestern districts. All showed increases



over the corresponding week two years ago except the Eastern district. Grain and grain products, livestock, forest products, merchandise and miscellaneous showed increases as compared with last year.

The summary as compiled by the Car Service Division of the American Railway Association follows:

REVENUE FREIGHT CAR LOADING

Week Ended Saturday, October 18, 1924

Districts	1924	1923	1922
Eastern	245,600	255,633	247,624
Allegheny	212,199	217,512	204,883
Pocahontas	52,744	44,738	30,654
Southern	155,493	145,674	135,046
Northwestern	169,167	172,554	148,213
Central Western	185,151	169,601	161,093
Southwestern	81,982	67,383	62,376
Total Western districts	436,300	409,538	371,682
Commodities—			
Grain and grain products	69,998	48,763	53,151
Livestock	43,092	42,387	40,414
Coal	191,449	192,864	193,519
Coke	9,654	11,860	10,558
Forest products	72,203	70,849	59,874
Ore	41,900	61,924	45,712
Mdse., l. c. l.	255,806	252,971	230,615
Miscellaneous	418,234	391,477	356,046
Total	1,102,336	1,073,095	989,889
October 11	1,088,462	1,085,938	969,487
October 4	1,077,006	1,079,776	953,952
September 27	1,087,447	1,097,493	977,791
September 20	1,076,553	1,060,811	961,138
Cumulative total, January 1 to date	38,970,818	40,542,048	34,220,426

The freight car surplus for the period October 8 to 14 averaged 99,952 cars, including 50,160 coal cars and 28,002 box cars. For the Canadian roads the surplus was 9,450 cars, including 7,300 box cars.

Canadian Loadings Lower Than Last Year

Revenue car loadings at stations in Canada for the week ended October 18 amounted to 70,013 cars as compared with 67,941 cars in the previous week. Grain loading was heavier in the West but fell off in the East. Live stock showed gains in both divisions; pulp and paper, coal and miscellaneous freight were up in the East, and merchandise was heavier in the West. Compared with the same week last year the car loading was lighter by 4,976 cars.

	For the week ended—1924		
Total for Canada—	Oct. 4	Oct. 11	Oct. 18
Commodity	Cars	Cars	Cars
Grain and grain products	16,992	15,942	16,448
Live stock	2,556	2,863	3,091
Coal	6,896	7,391	7,561
Coke	247	319	259
Lumber	3,651	3,695	3,677
Pulpwood	1,395	1,576	1,504
Pulp and paper	1,751	1,718	2,004
Other forest products	2,164	2,350	2,486
Ore	1,003	1,691	1,153
Merchandise, l.c.l.	16,080	15,790	16,077
Miscellaneous	14,179	14,706	15,753
Total cars loaded	66,914	67,941	70,013
Total cars received from connections	32,165	31,257	31,733
Total cars loaded for corresponding week, 1923	71,390	72,916	74,989
Cumulative loading to date—1924			2,290,418
Cumulative loading to date—1923			2,223,609

THE VETERAN EMPLOYEES' ASSOCIATIONS of the central region of the Pennsylvania Railroad, acting through delegates sent to a conference held in Pittsburgh, Pa., on October 14, have established a "Council of Veteran Employees' Associations." The purpose of the movement is to correlate and improve the relations between the different associations, in the Central region; also to take action outside of the central region where such a course may seem useful and desirable. The president of the council is W. E. Perry, Pittsburgh; secretary, W. E. Latimer, Pittsburgh.

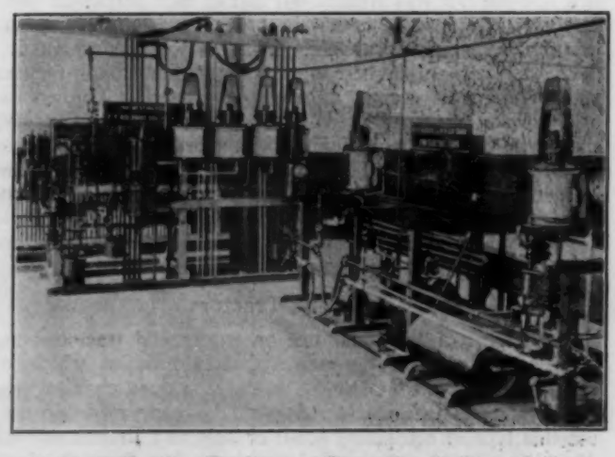
President Coolidge on Government Ownership

WASHINGTON, D. C.

PRESIDENT COOLIDGE included a brief discussion of the government ownership question in an address at a meeting of the United States Chamber of Commerce on October 23 which was also broadcast by radio through 23 stations throughout the country.

"It has always been the theory of our institutions," he said, "that the people should own the government and not that the government should own the people. James Otis stated this principle before the Revolution, when he said that 'kings were made for the people, and not the people for them.' This policy cannot be maintained unless the people continue to own and control their own property. The most important property of the country is transportation and water power. It is not only very large in amount, but is of the greatest strategic value. It could be used in such a way as to assume virtual control of all other business of any importance. It is proposed that these properties should be brought under public ownership. Responsible public commissions have valued these at about $35,000,000,000. Such a cost would more than double all our public debts. Any deficit in earnings would have to be made up out of taxes. We did that during the war at a cost of $1,600,000,000. With the government in possession of such a great engine, with two and three-quarters millions of employees, spending $9,000,000,000 or $10,000,000,000 each year, holding virtually the power of life and death, what chance would the rest of the people of this country have? It would appear to be perfectly obvious that if these properties are taken off the tax list by public ownership, the other property of the nation must pay their yearly tax of some $600,000,000. In the thinly settled agricultural regions this would make an increase of 30 or 40 per cent on local taxation.

"They have government ownership abroad. It takes 23 men in Germany to move a ton of freight one mile, 24 men in Italy, 31 in Switzerland. In the United States it takes only 5 men. It is interesting to note also that reduced to terms of bread and butter, railroad employees in these countries show weekly earnings of only about one-third of those in this country. Measured by our experience, by efficiency of service, by rate of wages paid, we have everything to lose and nothing to gain by public ownership. It would be a most perilous undertaking, both to the welfare of business and the independence of the people."



Airbrake Testing Equipment, Pennsylvania State College

Electrical Engineers Hold Annual Convention

Fifteenth Anniversary Meeting at Chicago Marks Epoch of Remarkable Progress and Achievement

THE FIFTEENTH ANNUAL CONVENTION of the Association of Railway Electrical Engineers, held at the Hotel La Salle, Chicago, October 21 to 24, was called to order by the president, Ernest Lunn, electrical engineer Pullman Company, at 10 a. m., October 21. In his address Mr. Lunn said in part: "We have no misgivings as to whether you will hear and see things that interest you during the meetings and while inspecting the exhibits, which this year for the first time, cover the entire nineteenth floor of this hotel. As the index of interest taken in the affairs of this organization space in the exhibit room, although almost double what it ever has been in years past, is at a premium.

"The association by virtue of the earnest and untiring efforts of those who have had its affairs in charge, during the fifteen years of its existence, has taken its rightful place as a nationally known and well thought of organization, the proceedings of which hold the attention, not only of engineers, but of many others, including railway officers. The high standard established must be maintained in whatever is undertaken. It is expected of us."

The report of the secretary-treasurer, J. A. Andreucetti, showed a balance of approximately $4,000 in the treasury. At the suggestion of the secretary-treasurer it was decided to compile a loose leaf manual which will contain recommended and adopted practices of the association. This will not include data in special treatises previously published by the association, such as the Car Lighting Handbook and the Headlight Handbook.

Economics of Electrical Appliances

The committee report on economics of electric appliances included considerable data from a large number of roads, showing unmistakably important savings made by the adoption of electrical apparatus. These savings covered such apparatus as pumping stations, coaling stations, electric arc welding, car and locomotive shops and turntables. In the discussion which followed a number of cases were mentioned where installation of electrically driven equipment had replaced both labor and other apparatus and in practically every case very appreciable savings were made.

The comparison of gas and oil engines as competitors of electrical equipment, was made the topic of lengthy discussion and the fact was brought out that in each particular case careful study was necessary in order to determine which was the more economical method. This particular point in the discussion applied more to pumping stations than to other uses of electrical energy, although in general it applied to all. Instances were cited where it was unquestionably cheaper to use gas or oil engines. In short, while the majority of installations could be made more economical by the introduction of electrical operating equipment, there are some where other power is preferable and it is up to the electrical engineer to make this study and present his findings to the management so that the best results may be secured.

Trucks and Tractors

The report of the committee on trucks and tractors was brief, principally for the reason that information which it had secured from the roads by means of a questionnaire was conflicting and inadequate. Apparently many roads do not use this type of equipment at all or only to a limited extent. The difficulty in securing information arises from the fact that where trucks and tractors are operated these utilities come under a scattered jurisdiction and often under non-technical department heads. The committee has made very little progress in securing data as to the expense of maintaining this type of equipment.

Electric Welding

The committee on electric welding proposed to begin work on a manual on this subject so that the best practices may be available to everyone interested. This would make possible the securing of better and more uniform results. The committee was authorized to proceed with the preparation of the manual.

In the discussion of the general subject of electric welding one interesting example was cited which showed how electrical equipment was placed in one shop with savings guaranteed. One large road, the management of which was skeptical regarding the savings that could be effected by the electric welding, refused to purchase any electric welding equipment. The electrical engineer of the road sought the assistance of the welding apparatus manufacturers and had them make an extraordinary offer to the management. It was that the welding machine manufacturer should install the equipment in the shops and that the payment for the machines should be made out of the savings which the machine made and that the management should say just what the savings were. This unusual offer was taken up by the management and an annual saving of approximately $50,000 was acknowledged. On this same road an interesting comparison of gas and electric welding was made showing the relative cost of each. On certain kinds of repair work which could be done equally well by gas or electric welding, it was found that the gas cost from $1.75 to $3.15 per pound of metal deposited while the cost for the electric process was only from 32 to 65c. per pound.

Electric Storekeeping

In an endeavor to seek out the best methods of keeping electrical equipment in the storehouse the committee on electric storekeeping sent out questionnaires to a large number of roads. These replies were at considerable variance with each other. In the discussion of the report it was fairly well brought out that because of the large number of electric parts which the storeroom must necessarily carry, a man from the electrical department should be in charge of this particular part of the storeroom. It was pointed out that such a man, who must necessarily be familiar with all electrical material, such as is used in the electrical, signal, telephone and telegraph departments, would be a valuable man and should receive higher compensation for his services than the ordinary storeroom clerk. As against this practice, however, another was cited in which the man did not need to be familiar with such a great amount of material. By having material carefully separated into proper storage bins and having each bin bear the catalog number of the part which it contained, it was believed by the advocate of this system that no trouble would ensue. No definite conclusions as to what should be the recommended practices were arrived at and the committe was discontinued.

Safe Installation and Maintenance of Electrical Equipment

The increasing use of electrical equipment of all kinds has made it more and more important that every possible

protective measure be taken to insure safety from shock from the various types of apparatus connected to electrical circuits. The committee on safe installation and maintenance of electrical equipment drew up a list of certain recommendations, believing that if these recommendations were accepted and complied with, the loss of life or serious injury from electric shock would be very greatly minimized.

One of the chief sources of shock of this kind is to be found in the extension cords used for portable lamps and other small portable apparatus, such as reamers, drills, etc. In the former case men working around locomotives, particularly inside of the firebox, are especially subject to shock from broken down insulation at the lamp. Two methods of correcting this were discussed. On one road a 32-volt system has been installed for use with the extension lamps and appears to be working out satisfactorily with the possible exception that 32-volt lamps of regular construction are not to be had at the present time. Mill type lamps, which will stand almost any amount of jar are usually built for 110-volt circuits, although this could probably be changed if there was a sufficient demand for the lower voltage lamp. The road which has adopted this type of service builds its own transformers at a cost of approximately $11.00 each, which is considerably less than they can be bought from manufacturers.

The second method for reducing the hazard from shock in the case of extension cords was one which had been more generally adopted and consists of running a grounded wire along with the wires carrying current to the lamp. In this case the lamp socket and fixtures are grounded, thereby making it impossible to obtain the shock from the device. Exception was taken by a number of members to the recommendation of the committee that lead covered or armored cable be used as it had been found that high grade rubber insulated wire was equally good and in some cases superior to the lead covered wire on account of the deterioration which the latter was subject to, due to electrolysis. It developed that some roads were obliged to use lead covered wire where they passed through certain cities, whether they wanted to or not, but where not so obligated there seemed to be a tendency in favor of high grade rubber covered wire. With a slight modification of the recommendation concerning the lead covered wire the report of the committee was adopted.

Illumination

The committee on illumination included part of a manual giving very explicit information concerning the various methods of lighting used in railway work. The chairman of the committee also announced that it was the aim of the committee to try to reduce the large number of lamp shapes and sizes that are at present considered standard. The study of light conditions is an important one. In one case which was cited an electrical engineer made an inspection accompanied by the eye doctor of the road, to ascertain the lighting conditions in a certain office where 10 out of 13 clerks were reporting to the doctor for eye trouble. After making changes in the lighting the conditions were so much improved that after a short time there were only three of the original 10 who suffered in any way from eye strain. The committee report was adopted and the committee continued.

Self-Propelled Cars

The discussion on self-propelled cars indicated that anything like a settled policy regarding this equipment is quite out of the question, probably for the reason that so much development work by various manufacturers is going on at the present time. Just what kind of car will best meet all requirements appeared to be uncertain. Also in the matter of maintenance opinions varied widely as to the kind of man who should do the maintenance on such equipment. Some felt that the regular railway forces should be trained to do it and others believed that the best results would be secured by bringing in men from the automotive industries. The question of the adaptability of this type of equipment to the use of the post office department was discussed at some length and a number of instances were cited where these cars had been satisfactorily equipped with the post office facilities with the exception that the facilities installed were slightly smaller than those in use in regular railway postal cars. In connection with providing sufficient light for railway mail equipment, considerable discussion arose as to whether automobile lamps or the standard 32-volt car lighting lamps should be used but no definite conclusions were reached regarding this question. The report was accepted and committee continued.

Starters and Controllers

The purpose of the committee on starters and controllers was stated as not that of trying to lay down specifications for the manufacturers of such equipment to follow, but rather in a general way to recommend the kind of equipment that should be used in the various locations. The discussion of this subject centered almost exclusively about a single question asked by one of the members regarding the installation of a motor driven air compressor set which would automatically cut in and out from 15 to 20 times per hour. It was further specified that this set should be driven by a synchronous motor and that every function of the outfit should be completely automatic so that it would operate from 30 to 90 days without any inspection whatever. A number of engineers had compressor appliances working automatically with induction and slip ring motors but none were able to answer the question. The matter is important for the reason that any large electric installations using other than synchronized motors and cutting in and out 15 to 20 times per hour woud have a serious disturbing effect upon the voltage of lines in the vicinity, and also produce a low and undesirable power factor. The road seeking the information was involved in a controversy with a large city power company which insisted on a power factor considerably higher than was possible to obtain with induction or slip ring motors.

Overhead Distribution and Contact System

Although the association had no committee on heavy electric traction this year the subject was touched upon in one of its phases at least in a paper prepared by R. E. Wade of the General Electric Company on overhead distribution and contact systems. It contained a large number of illustrations of overhead catenary construction used in America and Europe.

Automatic Train Control

In view of the fact that train control is the latest development in which electrical engineers are interested, not a great deal could be said regarding the general maintenance of this equipment. The committee presented an outline of the experiences of two roads which have had train control systems in operation for some time—the Chesapeake & Ohio and the Chicago, Rock Island & Pacific. In the case of both of these roads record cards were shown indicating the methods used in keeping track of inspection and repair work. In addition to this the Chesapeake & Ohio had furnished the committee with a table showing the actual cost of locomotive maintenance of train control apparatus for a period of a year and a half.

One of the questions asked during the discussion was whether or not it would be necessary to have a different character of wiring on the locomotive than is ordinarily used for locomotive headlight work. In reply to this it was brought out that No. 18 flexible wire with 19 strands was

used and that particular attention was given to the making of connections. When the work of wiring is carefully done, apparently very little trouble results, but if it is carelessly done loose connections develop and failures occur. It was stated that headlight men when first given train control equipment to maintain did not realize the necessity of extreme care and until they learned the importance of this considerable trouble was experienced. One of the roads makes a practice of inspecting its train control apparatus at each terminal after every run of the train.

The problem of using headlight generators for train control equipment also introduces some unusual conditions. It has been found that headlight generators when used for this purpose tend to produce certain undesirable pulsating currents which in the case of inductive types of train control are exceedingly bothersome. These conditions, as was stated by one of the manufacturers of headlight equipment present, are being studied and it is expected that they will be entirely overcome within a short time. It was pointed out that as the greater amount of apparatus in connection with train control is located on the locomotive, mechanical and electrical men will be the ones chiefly responsible for its satisfactory operation.

Locomotive Electric Lighting

The report on locomotive lighting concerned itself principally with the relative sizes and shapes of lamps used in headlight practice and the discussion which followed centered chiefly around this subject. The matter of lamp sizes is a question which always provokes a great deal of argument for the reason that the different roads insist on using different sizes. At present two lamps are in general use, one having a diameter of 2⅛ in. and the other a diameter of 1¾ in. Both of these are used for cab lighting and it is the hope of the committee that one of these can be made standard and the other discontinued.

Train Lighting Equipment and Practice

The principal item of importance brought out by the train lighting committee was the recommendation of larger battery boxes which will permit higher cells to be used with greater sediment space in the bottom. With this extra space at the bottom of the cell it is evident that car lighting batteries can be operated for much longer periods without cleaning and at a very much lower cost on account of reduced labor charges. In some cases batteries can be used for several years before it becomes necessary to clean them. The subject of rubber covered jars came in for a large amount of discussion and opinion seemed to differ considerably as to the quality of rubber that would be most economical to use for this purpose.

Very excellent results have been secured by one road using rubber jars exclusively, the cost of jars per month per car being only 19c. for coaches and 24c. for Pullman cars.

Train lighting from turbines located on locomotives was also the subject of considerable discussion. This type of lighting is apparently coming into more favor for certain suburban runs and turbo-generator sets of 7½ kw. capacity have been developed to take care of this new operating condition. One road which has been operating suburban trains lighted from turbines on the locomotive reported remarkable success and freedom from trouble. It was evident, however, that local circumstances will govern the selection of equipment and local conditions will determine whether it is best to use turbo-generators on the locomotive for train lighting on certain runs or to use axle lighting equipment for this purpose.

Radio on Moving Trains

The committee on radio as applied to moving trains presented information as to what had been accomplished in the way of reception of broadcasting on trains. That radio equipment has been very greatly improved during the past year or so was plainly indicated by the fact that excellent results are being obtained. That the passengers are interested is certain from the number of instances cited where they had expressed their opinions on the subject. This is especially true on long trans-continental runs. With the development of super-broadcasting stations which are at present contemplated, there is little doubt but that radio on trains will become more popular. Radio connection between head and rear ends of long freight trains was also mentioned and it was stated that equipment had been devised for this purpose; while it works satisfactorily, it was felt that it could be considerably improved particularly as regards the space which the apparatus takes up.

Power Plants

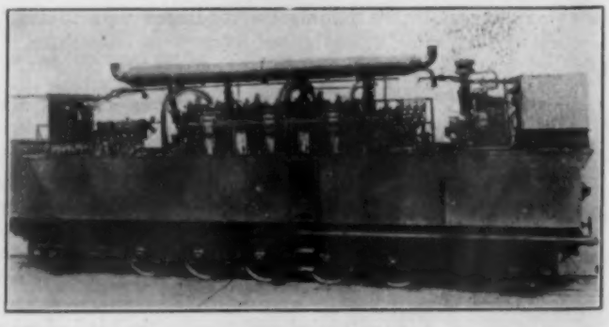
The report on power plants was brief, the committee devoting its time to pointing out the necessity for certain accessories to show just how efficiently the plant is operating. The discussion was also brief, but it showed unmistakably that many small railway power plants are operating most inefficiently. Quite a large number of old locomotive boilers are being used, and these frequently tend to make efficiency impossible.

Conclusion

The fifteenth annual convention of the Association of Railway Electrical Engineers was by far the most successful that the organization has ever held. The meeting rooms were jammed, the average attendance being a little short of 200 at each meeting. The display of exhibits on the 19th floor of the hotel was larger and better than ever before, and there is every indication that the organization has outgrown the space which it had this year.

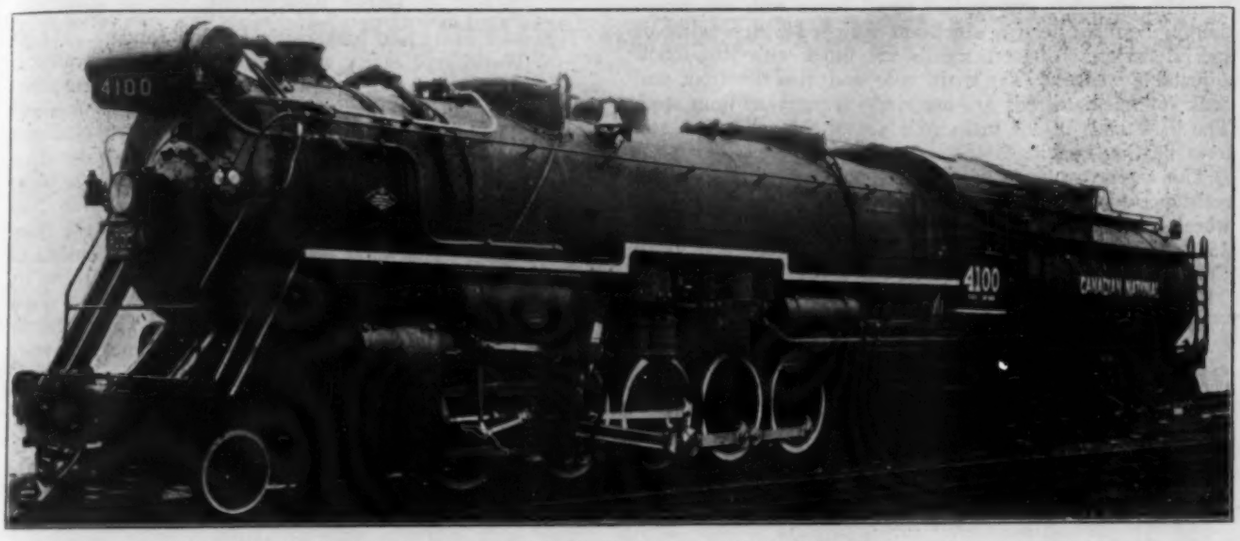
For the coming year the following officers were elected: F. J. Hill, president, Michigan Central; E. Wanamaker, first vice-president, Chicago, Rock Island & Pacific; C. R. Sugg, second vice-president, Atlantic Coast Line. J. C. McElree, Missouri Pacific and G. H. Caley, New York, Ontario & Western were elected as new members of the executive committee. The nominating committee will consist of J. R. Sloan, Pennsylvania Railroad; C. R. Gilman, Chicago, Milwaukee & St. Paul; E. Marshal, Great Northern; J. E. Gardner, Chicago, Burlington & Quincy, and E. Lunn, Pullman Company.

The officers which the Railway Electrical Supply Manufacturers' Association elected for the coming year are: Geo. H. Scott, president, Safety Car Heating & Lighting Co., Chicago; E. A. Lundy, senior vice-president, E. A. Lundy Co., Cleveland; and W. Fenley, junior vice-president, Kerite Insulated Cable & Wire Co., Chicago.



Keystone

A New German Diesel Locomotive with Cab Removed



Santa Fe Type Locomotive Built for the Canadian National by the Canadian Locomotive Works, Kingston, Ont.

New Locomotives for the Canadian National

The Santa Fe Type Selected for Use in the Toronto Terminals To Decrease Operating Costs

By C. E. Brooks
Chief of Motive Power, Canadian National

FIVE SANTA FE TYPE LOCOMOTIVES have recently been delivered to the Canadian National by the Canadian Locomotive Company, Kingston, Ont. These locomotives are the largest in the British Empire and are also considered to be the largest of their type in the world. They were built for heavy transfer service between the Danforth and Mimico yards in the Toronto, Ont., terminal district, a distance of 12 miles with a miximum grade of 0.6 per cent going west and of 1.2 per cent going east.

These locomotives are known on the Canadian National as the T-2-a class, road numbers 4100 to 4104. They have a total weight, without the tender, of 409,000 lb. The weight on the drivers is 321,000 lb. The tractive force, without the booster, is 80,200 lb., and 91,735 lb. with the booster. The cylinders are 29 in. by 32 in., and the driving wheels are 57 in. in diameter, with 50-in. cast centers.

The Boiler, Firebox and Attachments

The boiler is of the extended wagon top type with radial stays, conical bottom, and has a combustion chamber. The largest course is 104 in. in diameter. The boiler horsepower is 106.7 per cent of the cylinder horsepower on the basis of Cole's ratios. The flues are welded into the back tube sheet and the Canadian National's standard method of crown staying, similar to that used on the Mountain type locomotives, described in the August 4, 1923 issue of the *Railway Age*, was carried out.

The locomotives are equipped with Duplex stokers and Elesco type feed water heaters, the drums of which are mounted on brackets on the front of the smokebox. Hancock non-lifting inspirators with 6,000 gallon tubes are located on the right-hand side.

The boilers are equipped with Type A superheaters and Franklin No. 9 fire doors. Steam for the boosters, with which the locomotives are equipped, is taken directly from the superheater header and the main shut-off valve is placed behind the stack.

The grates are of the Canadian National standard design, the rocking grate bars being of alloy cast steel with detachable lugs. The ashpans are of the center hopper type with an auxiliary hopper placed on each side of the engine outside of the trailing truck frame. These auxiliary hoppers are equipped with cast steel frames and doors and are designed principally to improve what would otherwise be a comparatively flat pan owing to the use of a Delta truck and booster. The Canadian National's standard sludge arrangement, consisting of a 1¼-in. pipe from the delivery pipe of the inspirator to the ashpan, with a valve which is operated from the cab and a branch extending into each hopper, is also applied. This arrangement has been found to be very serviceable during the severe winter weather encountered in Canada. In addition, an auxiliary ashpan blower is used, consisting of a ¾-in. perforated pipe across the back of the ashpan, which obtains its steam supply from the turret. This device is found desirable because the booster application and wide firebox somewhat restricted the slope of the pan at the back.

The Frame and Running Gear

The frames, with a single forward section, are made of vanadium steel, the rear end being fitted with a Commonwealth cast steel cradle casting. The wheels are fitted with brass hub liners. Hollow driving axles are used, the main journals being 12½ in. by 13 in. and the others 11 in. by 13 in. Grisco driving boxes have been applied at the main wheels, the feature of this box being a three-piece crown bearing fitted with a wedge adjustment. Lateral motion boxes have been applied at the front driving wheels and

Franklin spreaders are applied to all boxes with the exception of the main drivers which are equipped with a cellar of special design. The crossheads are fitted with Rogatchoff adjustable wedges. The main rods and also the front and back intermediate rods are made of carbon vanadium steel. The back ends of the main rods are of the solid type and have floating bushings.

The engine truck is of the Economy two-wheel constant resistance type equipped with Preston hub slip liners. The wheels are 31¼ in. in diameter with spoked steel centers 25 in. in diameter. This type of wheels is common to all Canadian National freight locomotives of modern design. The journals are 6½ in. by 12 in. The trailing truck is of the Commonwealth constant resistant type, adapted to carry a booster with 43-in. wheels, 35-in. cast steel centers, and 9-in. by 14-in. journals.

Table of Dimensions, Weights and Proportions

Railroad	Canadian National
Builder	Canadian Locomotive Company
Type of locomotive	2-10-2
Service	Freight
Cylinders, diameter and stroke	29 in. by 32 in.
Valve gear, type	Walschaert
Valves, piston type, size	Piston, 14 in.
Weights in working order:	
On drivers	321,780 lb.
On front truck	28,780 lb.
On trailing truck	58,680 lb.
Total engine	409,240 lb.
Tender	245,800 lb.
Wheel bases:	
Driving	21 ft. 8 in.
Total engine	42 ft. 2 in.
Total, engine and tender	80 ft. 9¼ in.
Wheels, diameter outside tires:	
Driving	57 in.
Front truck	31½ in.
Trailing truck	43 in.
Boiler:	
Type	Ext. wagon top
Steam pressure	200 lb. per sq. in.
Fuel, kind	Bituminous
Diameter, first ring, inside	94½ in.
Firebox, length and width	120 in. by 96¼ in.
Combustion chamber, length	45½ in.
Tubes, number and diameter	264—2¼ in.
Flues, number and diameter	50—5½ in.
Length over tube sheets	21 ft. 6 in.
Grate area	80.3 sq. ft.
Heating surfaces:	
Firebox and arch tubes	356 sq. ft.
Tubes and flues	5,178 sq. ft.
Total evaporative	5,534 sq. ft.
Superheating	1,558 sq. ft.
Comb. evaporative and superheating	7,092 sq. ft.
Tender:	
Water capacity	11,000 Imp. gallons
Coal capacity	16 tons
General data estimated:	
Rated tractive force, 85 per cent	80,200 lb.
Rated tractive force with booster	91,735 lb.
Cylinder horsepower (Cole)	3,025
Boiler horsepower (Cole) (est.)	3,200
Weight proportions:	
Weight on drivers ÷ total weight engine, per cent	78.5
Weight on drivers ÷ tractive force	4.01
Total weight engine ÷ cylinder hp	135
Boiler proportions:	
Comb. heat. surface ÷ cylinder hp	2.34
Tractive force ÷ comb. heat. surface	11.32
Tractive force × dia. drivers ÷ comb. heat. surface	644
Cylinder hp. ÷ grate area	37.65

Steam distribution is provided for by a Walschaert valve gear, the diameter of the piston valve being 14 in. The valves are set with a travel of 7 in., 1-3/16-in. lap, ⅛-in. lead, and line and line. A Precision power reverse gear is applied. The cab is of the Canadian National's short vestibule type of substantial construction securely riveted to the boiler with 3-in. by 4-in. angle iron around the front. In order to take care of expansion the cab brackets are designed to permit the cab to slide on the cradle casting. The railway company's standard turret, which was also described in the article on the Mountain type locomotives, to which reference has already been made, as well as the Hancock non-lifting inspirator operating valve, the blower valve and the stoker engine valve are placed outside the cab.

Other Equipment

The sand boxes are fitted with Hanlon sanders. Three 3½-in. World type safety valves are used, one of which is muffled. The air brake equipment is of Westinghouse manufacture, in which is included one 8½-in. cross-compound pump. The headlight equipment consists of a Pyle-National turbo generator set and Keystone lamp case on both the front of the engine and at the rear of the tender, which are fitted with 14-in. Golden Glow reflectors. The Canadian National's standard separate number lamp is used on the front of the engine. The water level indicating device consists of the railway company's standard water column welded directly to the backhead to which are fitted the try cocks and water glass fittings. The water glass is fitted with the railway's closed type of protector. Steam is passed into the train heating lines through a World-Leslie reducing valve. The piston and valve rod packing is King metallic. The radial buffer and unit safety bar are used between the engine and tender, and the piping between the engine and tender is equipped with Barco joints. A Madison-Kipp four-feed mechanical lubricator is used for lubricating the valves and cylinders and a Nathan three-feed lubricator is used for the auxiliaries.

Tender Design

The tank is of the Vanderbilt type and is the first of its kind to be used in Canada. The water capacity is 11,000 Imperial gallons and the coal capacity is 16 tons. The tank is carried on a Commonwealth cast steel tender frame and six-wheel tender trucks with 34¼-in. steel tired wheels and semi-steel center 28 in. in diameter and 5½-in. by 10-in. journals. The trucks are equipped with clasp brakes.

This locomotive has maintained in actual service a drawbar pull of 77,000 lb. to 79,000 lb. on a one per cent grade. The important proportions and dimensions are in the table.

According to figures compiled by the Northern Pacific 144,158 people visited Yellowstone National Park in 1924. Among the states the largest number of visitors arriving by railroad came from Illinois, the total being 5,892; New York was second with 3,783; those from Ohio totaled 3,115, Pennsylvania 2,908, Missouri 2,023, California 1,988, Michigan 1,208, Wisconsin 1,151, Indiana 1,140, New Jersey 1,101, Iowa 1,065 and Minnesota 1,052.

Reproduction from a Large Colored Poster Prepared by the Metropolitan Railway, London, to Advertise Its Facilities to the Wembley Exhibition

A Plan for Budgeting Transportation Expenses

New Haven Method Corrects for Fact that Expenses Do Not Vary Directly with Traffic

By J. E. Slater
Special Assistant to General Manager, New York, New Haven & Hartford

MAINTENANCE OF WAY and maintenance of equipment expenses on many of our American railways have been, to some extent, controlled by an established budget for many years. Sometimes this budget covers only installations of ties, rail, other track material and important bridge and building work in the one case and expenditures for the maintenance of locomotives and cars in the other. In other cases a more elaborate budget is set up and includes all expenditures under maintenance of way and equipment accounts. In some cases this budget is made up independently of any revenue estimates, while in others, it is based upon a percentage of the estimated revenues of the coming year to be applied respectively against the two maintenance groups.

Throughout all of these various methods of preparing the budget of maintenance expenses, the same principle is involved; that of having a definite program set up well enough in advance to permit the gathering of the necessary material and the application of it at the time when it can most economically be done.

There have also been some attempts made to budget transportation expenses. In some cases, the transportation expenses have been set up in advance each month of the year. This idea, however, is substantially different from that of the budget since it is a method of a month-to-month control of the expenses rather than a method of forecasting and controlling the expenses over a period of a year. Transportation as well as other expenses have also been included in various preliminary forecasts, but these forecasts or budgets have been of little value as far as the transportation expenses were concerned, because if the volume of traffic handled was to any extent greater or less than the volume anticipated, it was recognized that the transportation expenses would naturally be changed thereby. In other words, if the volume of traffic greatly increased over the estimate, any reasonable increase in transportation expenses was not subject to criticism. There was, however, no essential control of this increased expense, nor was it possible to determine whether the increase was more or less than that absolutely necessitated by the additional business. On the other hand, maintenance expenses, both in way and structures and equipment, could be essentially controlled without respect to the increase in business. On the basis of the traffic forecast, it was determined that a certain proportion of the revenues would be expended for maintenance. If the business increased no greater amount would be needed for maintenance, unless the management determined that such was advisable. There was a continuous control of the increase or decrease in expenses.

This is to be contrasted with the lack of control on the part of the operating or executive officers of the increase in transportation expenses, which are, to some extent at least, made absolutely necessary by the increased volume of traffic. It is on this account that when the New Haven set out to establish a budget in the year 1924 and set a mark for transportation expenses, a serious attempt was made to establish a direct and constant budget control of transportation expenses without regard to the volume of business which might be handled.

The budget was set up in the first place, on the basis of an assumed volume of business and consequent revenue. Estimates were then made covering each one of the general expense accounts, indicating the amount that should be expended each month for each one of these general accounts.

Method of Making Budget Flexible

The next problem which was attacked was the method of making the transportation budget flexible so that with increases or decreases in traffic, the budget would automatically increase or decrease in the proportion that the expenses should increase with the volume of traffic. It is recognized by all that transportation expenses do not fluctuate directly with the volume of traffic. It was also recognized that some expenses would fluctuate with passenger traffic and others with freight traffic. Transportation expenses were, therefore, analyzed to determine which expenses were substantially fixed and which were variable.

In the first group of expenses were included charges for supervision, dispatching, employees at small stations, station supplies and expenses, expenses at small yards, charges for yardmasters and clerks, switch and signal tenders, operation of towers, draw bridges, crossings, etc. By fixed expense it was not meant that there could be no decreases in these items, but that there would be no fluctuations in the budget once it was established. This left from out of the transportation expenses, first, the freight house expense at large freight stations, excluding the freight office and general supervisory forces; second, the expenses at large yards, exclusive of the yard supervision; third, freight train expense; fourth, passenger train expense; fifth, expense of floating operations, and sixth, the operation of coal and ore wharves. Each one of these was termed a variable expense, and analysis was made to see to what extent it fluctuated with the volume of traffic. It would have been simple if there could have been found one controlling item for freight service and another for passenger service. An analysis of the increases and decreases in traffic volume, however, very quickly indicated that the volume of freight business as expressed in ton-miles did not control or indicate the volume of business at freight stations or in freight yards. The volume of l.c.l. tonnage was found to increase at times when the total freight business expressed in gross ton miles decreased or vice versa, while the number of cars handled in yards did not follow either. The same applied to the other items of variable expense. It was found necessary to have separate factors of performance or output for each one of the items of variable expenses. The tons handled over the platform were taken as the unit of output for freight stations, cars handled in yards for yard expense, gross ton-miles for the freight train expense, passenger train-miles for the passenger train expense, cars floated for the floating operation and tons of coal and ore handled for the expense of coal and ore wharves. While it was recognized that each one of these factors had its limitations, they were commonly in use and were found for practical purposes to answer the requirement.

Even with this information, it was found that the problem was not completely solved. The variable items of expense

do not vary directly with the volume of traffic. Even at large freight stations a 10 per cent increase in tonnage does not require a 10 per cent increase in the platform expense. Likewise, a 10 per cent decrease in cars handled in yards does not permit of a corresponding decrease in the yard expenses. This is due to the fact that in all of these items of so-called variable expense there are fixed elements which do not vary directly with the volume of business handled. For example, under freight train expenses, an increase in gross ton-miles would not call for a corresponding increase in expense insofar as the gross ton-miles applied to traffic handled in local trains where the locomotives are rarely used to their rated capacity. Likewise, in some of the medium sized yards a considerable increase or decrease in cars handled is necessary before a corresponding change can be effected in the number of yard crews. On this account it was necessary to compare separately the fluctuations in each one of the variable expense items with the fluctuations in the corresponding unit of output and to determine the relationship of percentage increases or decreases in expense

1. Tons of l. c. l. freight handled at variable stations
2. Cars handled in variable yards
3. Gross ton miles
4. Passenger train miles

and where necessary the corresponding units for floating operations and for the operation of coal and ore wharves. There was likewise provided for each division a factor showing the relationship of percentage increases or decreases in expenses to the percentage increases or decreases in the corresponding units of traffic. In establishing the amount of money necessary for the handling of the contemplated number of units in stations, yards, trains, etc., it was necessary to use past performance as a basis. A year of excellent operating performance and lacking unusual conditions was taken as a basis and the best performance chosen as a guide. In some cases the best unit costs were multiplied by the anticipated volume of traffic. Likewise, the factors showing percentage relationships of expense to volume of traffic were based upon the relative increases of expense and traffic in the same period. This background of information is ob-

TABLE I

TRANSPORTATION EXPENSE BUDGET FOR A. B. DIVISION—YEAR 1924

	January	February	March	April	May	June	July
Budget fixed expense	77,949	74,984	81,759	79,870	81,764	83,725	80,775
Budget variable expense—							
Stations	3,284	2,991	3,284	3,240	3,279	3,508	3,438
Yard	6,109	5,000	5,300	5,100	5,300	6,597	6,428
Passenger train	28,479	26,500	29,000	28,000	29,000	30,854	32,820
Freight train	61,819	59,441	63,446	54,166	57,417	60,322	58,773
Coal wharf	1,561	1,208	2,000	1,500	1,746	1,165	1,243
Total	179,201	170,124	184,789	171,876	178,506	186,171	183,477
Budget performance—							
Budget variable expenses:							
Station tons	6,800	6,200	6,800	6,800	7,400	7,900	7,700
Yard cars	6,952	6,496	6,952	6,952	7,578	8,244	8,000
Passenger train miles	91,300	80,900	89,700	87,400	91,100	93,700	97,400
Freight g.t.m.	100,000,000	93,548,000	100,000,000	100,000,000	108,000,000	114,000,000	111,000,000
Coal wharf tons	12,400	12,100	17,800	14,000	18,800	13,560	8,300

	August	September	October	November	December	Total
Budget fixed expenses	81,122	78,108	79,734	81,294	86,877	967,961
Budget variable expenses:						
Stations	3,359	3,091	3,313	3,240	3,166	39,193
Yard	6,280	5,652	5,300	5,100	5,300	67,466
Passenger train	33,801	32,380	28,500	28,000	29,000	356,334
Freight train	57,334	51,406	57,517	53,881	56,959	692,481
Coal wharf	1,324	1,187	1,348	1,663	785	16,730
Total	183,220	171,824	175,712	173,178	182,087	2,140,165
Budget performance—						
Budget variable expenses:						
Station tons	7,400	6,600	7,200	7,000	6,800	84,600
Yard cars	7,735	6,589	7,768	7,061	7,061	87,388
Passenger train miles	99,100	97,800	91,800	94,400	91,300	1,105,900
Freight g. t. m.	107,800,000	93,965,000	108,680,000	100,000,000	100,000,000	1,236,993,000
Coal wharf tons	9,100	6,660	7,330	8,180	6,000	134,230

Per cent increase in variable expense to increase in traffic: Station, 80.0; yard, 70.0; passenger train, 100.0; freight train, 75.0; coal wharf, 100.0.

to the percentage increases or decreases in the volume of traffic.

This factor of the relationship of the increase or decrease of expense to traffic had to be worked out for each division and for each class of variable expenses. The factors varied widely, there being a spread in the percentage factor from 60 per cent to 100 per cent. This was to be expected on account of the differences in operating conditions on different divisions and at different points. When these factors had been established, the necessary data were available to work out the budget. There was established for each division and for each month a certain amount of money to be spent for transportation expenses, this amount being divided,—

1. Fixed expenses
2. Variable station expenses
3. Variable yard expenses
4. Variable freight train expenses
5. Variable passenger train expenses

and in the cases of certain divisions, variable floating and coal and ore wharf operating expenses.

With this amount of money was established a budget of operating factors; namely,—

viously of great importance and the longer the period available the fairer and more accurate the budget will be. A sample of a division budget in its final form is given in Table I.

Actual Results in a Typical Month

The manner in which the budget actually fluctuated with traffic is illustrated below. The superintendent was allotted approximately $179,000 for the month of January on the assumption that he would handle at the stations designated as variable stations, 6,800 tons of l.c.l. freight, at his larger yards, 6,952 cars, in his freight trains 100,000,000 gross ton-miles and in his passenger service 91,300 passenger train-miles. In addition, on this particular division, there were commercial coal wharves where it was estimated he would handle during the month 12,400 tons. In the particular month in question, however, the total volume of business was not up to expectations. The tons at the large stations were 5,964 instead of 6,800. The cars in yards exceeded those estimated as did the passenger train miles. The gross ton-miles, however, were 12 per cent less than the 100,000,000 estimated.

Since the station tonnage was approximately 12 per cept

less than estimated, the variable station expenses had to be reduced. The previous analysis indicated, however, that the station expenses would not increase or decrease directly with the increase or decrease in tonnage, but that a factor of 80 per cent should be applied to the increased or decreased per cent in tonnage. Instead of decreasing the variable station expenses, therefore, by 12.2 per cent, they were decreased 80 per cent of this, or a decrease of 9.76 per cent. On this basis the adjusted variable station expenses became $2,962. On the other hand, while the estimated cars handled in yards were 6,952, the actual cars handled were 7,902, an increase of 13.7 per cent. In yard performance it was found that the percentage of increase or decrease in expense was 70 per cent of the increase or decrease in the cars handled. Seventy per cent of 13.7 per cent is 9.6 per cent. The budget for variable yard expenses, therefore, is increased over $6,109 by 9.6 per cent, giving an adjusted figure of $6,695.

The budget for variable freight train expenses which is the most important of the variable items had to be decreased about 10 per cent because of a substantial reduction in the actual gross ton-miles handled as compared with the amount which the budget contemplated, etc. With all of the variable items adjusted, the budget for January was changed as follows:

	Budget	Adjusted
Fixed expenses	$77,949	$77,949
Variable station expenses	3,284	2,962
Variable yard expenses	6,109	6,695
Variable passenger train expenses	28,479	29,561
Variable freight train expenses	61,819	56,305
Variable coal wharf expense	1,561	1,224
Total	$179,201	$174,696

From this it will be seen that by the interacting of the various forces, the necessary expense for operating this division with the volume of business actually handled as compared with that contemplated was about $4,500 less than the original budget called for.

Another Example

In the case of some of the other divisions, the estimates in the volume of business were lower than the actual. In these cases, of course, the adjusted budget would be considerably higher than the original budget. In numerous instances, the adjustment resulted in the performance being better than the adjusted budget, although the total expense was more than that of the original budget. On one division, comparison of the estimated units of performance with the actual with the resulting effect on the budget, worked out as follows:

Units of performance	Budget	Actual
Tons at stations	84,000	87,015
Cars in yards	66,200	76,673
Passenger train-miles	253,450	252,803
Gross ton-miles	115,000,000	133,034,434
Cars floated	51,850	59,170
Transportation expenses	**Budget**	**Adjusted**
Fixed expenses	$202,647	$202,647
Variable station expenses	65,520	67,872
Variable yard expenses	57,800	66,944
Variable passenger train expenses	149,900	149,510
Variable freight train expenses	59,598	68,943
Variable floating expense	84,500	96,431
Total	$619,965	$652,347

In this particular case, the actual expenses of the division for the month were $650,702. With a fixed budget, the superintendent would have over-run his expenses by $31,000. He actually bettered his budget to the extent of $1,600. Furthermore, if he had had a fixed budget and it had been pointed out to him that he had over-run his budget to the extent of $31,000, a reasonable rejoinder would have been that while he over-ran his budget by about 5 per cent, the volume of freight business handled exceeded that contemplated in the budget by 15½ per cent. From this it would appear that in the one case he had made a poor showing and in the other case a remarkable showing, while actually he just about met the budget.

These illustrations show how valuable the flexible feature is in a budget of transportation expenses. No fixed transportation budget is fair to the superintendent or the other operating officers unless the estimates of the volume of business contemplated by the budget are invariably correct. Obviously, it is impossible for estimates to be made for each month for each division and for each unit of volume of traffic which will be exact.

Current Control

With the budget once established, it became important to devise means for a current control. To provide for this, new methods and statements were provided to furnish quickly the information necessary to check the actual results with the budget. On the New Haven, employees for the most part are paid weekly, and on this account most of the operating statements are weekly rather than monthly statements. This has a distinct advantage since it is possible to take quick action if the results indicate poor performance in the last weekly period. Three statements were instituted. The first of these was a wire report from the division accountants to the interested officers, including the general manager, giving the totals of the transportation payrolls for the previous week. This information is received on Monday morning of each week covering the week ending the previous Thursday night. Total figures only are given since the report is sent in prior to the distribution of the payroll to primary accounts. The transportation budget for each month is divided between labor, fuel, other material and other charges and the labor figures are translated into the average payrolls per week. This figure then becomes the payroll budget for the various weeks of the month and the total transportation payrolls are compared with the budget figures for each division and department. This information is tabulated on the form similar to that shown in Table II which is in the hands of the general manager Monday noon, similar information being in the hands of the general superintendents, superintendents, maintenance engineers, mechanical superintendents and so on, covering the information they desire.

TABLE II

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD, CENTRAL NEW ENGLAND RAILWAY

Comparison of Operating Department Payrolls with Budget

Transportation divisions	Payroll budget		Actual payroll				
	Month	Average week	First week	Second week	Third week	Fourth week	Total for month
Maintenance of Way Department							
Maintenance of Equipment Division							

After the distribution has been made and the charges made against primary accounts, a second statement is sent by the division accountants to interested officers showing labor charges to primary accounts and also fuel charges. This is tabulated on the statement similar to the one shown in Table III, information being in the hands of the interested officers about nine days following the week which the information covers.

Similar statements showing separately charges for labor and material for the maintenance of way and mechanical

departments are submitted at the same time. With these statements, the operating officers are able to follow closely the relationship of the actual charges for labor, material, fuel, etc., with the corresponding budget charges. The information is available in such a brief period that where any particular division or department is seriously out of step, the report immediately reflects that result and the necessary corrective action can be taken. Usually, however, the superintendent or other officer, having obtained the information at the same time, is in a position to take whatever action is possible before his attention is called to the results by his superior officers.

TABLE III

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD, CENTRAL NEW ENGLAND RAILWAY
Comparison of Operating Department Labor and Fuel Charges with Budget

	Transportation labor charges							Fuel charges					
Division	Labor charges, for month	Labor charges, average week	First week	Second week	Third week	Fourth week	Total, month	Fuel budget, average week	First week	Second week	Third week	Fourth week	Total, month
Division	Maintenance of Way Labor Charges										Material Charges		
Divisions and Shops	Maintenance of Equipment Labor Charges										Material Charges		

On Monday morning, when the first of these reports is made available, a fairly close estimate is made of the gross ton-miles for the corresponding period and when the second report is issued, the actual gross ton-miles are available. In this way, it is possible to determine to what extent the excess charges over the budget can be accounted for by the increase in the volume of business. There is no attempt to adjust the budget for volume of traffic from week to week.

The third report is a monthly report issued by division accountants and forwarded to superintendents, general superintendents and general manager with corresponding reports covering maintenance of way and maintenance of equipment charges to the interested officers showing charges by primary accounts and giving the basis for the complete check of the month's operations with the budget. This information is in the hands of the interested officers on the 17th of the month following that covered by the report. At this time the budget is adjusted to take care of the fluctuations in the volume of business and the final results tabulated showing the accomplishments of each division and department.

In addition to the weekly statements showing the comparison with the weekly budget, estimates are made on the 26th of the preceding month, on the 18th of the current month and on the 6th of the following month as to the total expenses for the month in question. The 26th of the month is naturally an estimate of what the expenses will be the succeeding month, based upon the expenses as they are running at that time and the estimate of the volume of business in the succeeding month. On the 18th of the month, with the information for the first periods of the month available, it is possible to give a closer estimate of what the results for the month will show. On the sixth of the following month, although the books have not been closed, it is possible for the division accountants to give a very close estimate of what the results for the preceding month will be. This information supplements the weekly reports in such a way that at all times there is fairly accurate information as to what the month's operations and results will be.

Results

Since the proof of pudding is the eating thereof, it is important to determine to what extent this budget principle has worked out in practice. The results have been very gratifying. The operating officers have all recognized that with a budget which fluctuates with the volume of traffic, they have an instrument to work with which is fair to all. Furthermore, such a budget gives the executive officers a feeling that excuses can not be made for failure to meet the budget on the ground that the amount of traffic handled exceeded to a certain extent that contemplated at the time that the budget was made up. It makes little difference whether the estimates of volume of traffic are correct or not since the budget automatically takes errors in traffic forecasting into account. It is, of course, preferable that the traffic forecast should be reasonably correct, for in that case the adjustments will be small. When errors do occur, however, no difficulty is experienced in handling the budget because of its flexible character.

Twentieth Anniversary of the New York Subway

THE first of the New York subways was opened to the public on October 27, 1904. The track mileage of this subway was 62; the car mileage for the first year was 29,471,154, and 116,000,000 passengers were carried during the first calendar year of subway operation. The track mileage of the subways of the Interborough Rapid Transit Company is now 240, the car mileage for the fiscal year ending June 30, 1924, was 124,025,653, and 714,933,187 passengers were carried during that year.

While the twentieth anniversary was recognized in various ways, the most important event was a dinner with about 600 guests at the Hotel Commodore in honor of Frank Hedley, the president of the Interborough Rapid Transit Company. The toastmaster was President W. G. Besler, of the Central Railroad of New Jersey. Major August Belmont, who was largely responsible for promoting the construction of the first subway and who financed the building of the first link, told something of the problem which was faced when it came to operating the new subway and why Mr. Hedley was selected to head up its operation.

Dr. J. Duncan Spaeth, professor of English at Princeton University, made an address on "Transportation." He brought out very clearly the vital necessity of a thorough understanding of and proper handling of the human element in a large transportation industry, and complimented Mr. Hedley for his ability in that direction. Neal O'Hara, of the *New York World*, made a humorous address on "Styles and Turnstiles."

Mr. Hedley responded to these addresses in a few well-chosen words, in which he expressed the highest appreciation for the co-operation which he had received from his associates and for the loyalty and co-operation of all of the employees. The banquet room at the Commodore was decorated in various ways, reminding the guests of the subway and its equipment. Entrance to the banquet room could only be obtained by depositing a nickel in one of the subway turnstiles. During the evening, much to the surprise of the guests, their coins were returned inside of souvenir bill cases with this notation: "The New York subways always have returned to every customer more than full value for every nickel received."

Meeting to Discuss Plans for the Deutsche Reichseisenbahn Gesellschaft—Sir William Acworth at Lower Left—Photo from Keystone

Reorganization of the German Railways*

Government Management Abandoned Under Dawes Plan to Make Efficient and Profitable Operation Possible

By Sir William Acworth

THE NEW GERMAN RAILWAY COMPANY—officially designated the Reichseisenbahn Gesellschaft—which has already come into legal existence, and which will in the course of the next few weeks take over the actual working of all the German railways, with negligible exceptions, is much the largest railway undertaking in the world. It employs three-quarters of a million men, as many as all the English companies put together. It operates 33,000 miles of line—half as many miles again as the next longest system, the Canadian National. Its nominal capital, £1,300,000,000 is far and away the largest. Its annual revenue of over £200,000,000 is not far from double that of its nearest rival, the Pennsylvania Railroad.

Republic Consolidated State Owned Roads

Before the war, though the German railways had long been nationalized, they belonged (with the exception of those in Alsace-Lorraine, which were owned by the Reich, but operated by Prussia) not to the Empire, but to individual states—Prussia, which owned five-eighths of the whole mileage; Hesse, Baden, Bavaria, Würtemberg, Saxony, Mecklenburg and Oldenburg.

In 1920, under the Weimar constitution, the several states handed over their railways to the Reich. Now the constitution provided that the Reich should not have power to part with the railways, and the constitution cannot be altered except by the vote of a two-thirds majority of the Reichstag. Hence all the recent alarms and excursions of the Nationalists before the final acceptance of the Dawes plan.

One point more must be noted before passing to the genesis of the plan. In November last, when, owing to the collapse of the mark, the expenditure of the railways was sevenfold greater than their receipts, the German government refused to finance them further and left them to stand on their own feet. A scheme for a separate undertaking under the management of the state was promulgated by ordinance in the following February; and the minister of communications became, as a transition measure, director-general. But within a few weeks came the publication of the experts' report, recommending the transfer of the railways to a commercial company. So the separate undertaking of February perished stillborn six months later, at the end of August.

At an early stage of the discussion of the reparation question the German government had offered to pledge the railway revenues as a guarantee for reparation payments. When, however, the expert committee began its sittings at the end of 1923 two things had happened. The old debt charged on the railways had been practically wiped out. It was payable in marks, and the value of the mark had fallen so far that, instead of being equal to a shilling, a shilling would buy a million million marks. On the other hand, the railways, though their financial position was already improved, so far from having a pledgeable net income, were still spending much more than they were earning.

Under these circumstances the committee called in a distinguished French railwayman, Monsieur Leverve, and myself to advise on the railway position. We made several interim reports in answer to specific questions put to us by the committee and summed up our conclusions in a document printed as an appendix to the experts' report.

Briefly, the conclusions were these. The nominal capital of the German railways is £1,300,000,000. The actual

* Reprinted from the London Times, September 19 and 20, 1924. The author, Sir William Acworth, and Monsieur Leverve, a Frenchman, were the railway experts of the Dawes Commission on Reparations.

value of the property is not less than this figure. The net earning power of the system may fairly be estimated at not less than £50,000,000 per annum. The railways are in first-class order. Capital has been spent so freely in the last few years that no serious new capital expenditure need be incurred for some years to come. For instance, two-thirds of all the rolling stock is less than ten years old.

State Management Erred Grievously

We came to the conclusion, however, that the state management of the railways had erred grievously in not advancing rates farther and faster in correspondence with the progressive fall in the value of the mark. We concluded that the state, which had traditionally regarded the development of German industry and trade as its first duty and had relegated the earning of a reasonable return on capital to the second place, could not be expected so to manage the railways as to earn all the net revenue which might reasonably be earned.

If adequate reparation payments were to be obtained from the German railways, we thought that this order of precedence must be inverted, and that a satisfactory result could only be secured if the railways were divorced from the state and handed over to be operated—not, be it observed, to be owned—by a company, a business concern, with a board of directors who should be business men, mainly German, but with a leaven of representatives of allied interests. We recommended further that a railway commissioner should be appointed, with wide powers of inspection as long as things went right, and with wider powers of interference if things should go wrong.

The expert committee in framing their own scheme substantially accepted our conclusions. They recommended the transfer of the railways to a German company, on whose board of 18 members there would be at least four foreigners, and the appointment of a trustee for the railway bondholders and of a railway commissioner. They fixed the capital of the new company at £1,300,000,000 divided as follows:—£550,000,000 should be Reparation bonds (bearing after an interim period interest at 5 per cent with 1 per cent sinking fund calculated to redeem the whole issue within 40 years); £100,000,000 preference shares, to be sold from time to time to the public; and £650,000,000 ordinary shares, representing the value of the reversion, to be issued without payment to the German government. They further proposed that the transport tax, which had been levied since 1917 on railway gross receipts for general Government purposes, should be continued, but paid over to the reparation commission up to a maximum of £12,500,000 per annum. This implied that £45,500,000 per annum (a sum equal to 3½ per cent of their capital value) should be charged upon the railways for reparation purposes.

Rates Advanced; Bonds Safeguarded

Since November, 1923, railway rates have been substantially raised both for goods and passengers, and according to present indications it will be well within the power of the German railways to earn a net revenue of £45,500,000 without undue burden upon the customers. But lest there should be any question as to the value of the reparation bonds as a security, the experts' plan provided two further safeguards.

In the first place the bonds were to be guaranteed by the German government. And in the second place the plan proposed the appointment of a commissioner of controlled revenues, to whom should be paid the whole budget receipts from alcohol, tobacco, beer, sugar and customs. Normally, after deduction of certain fixed sums for reparation purposes, his duty will be to hand over the balance of these receipts to the German government. But if the railways should fail to make their due payments, and if the government should fail to meet its guarantee to fill the gap, the commissioner of controlled revenues is empowered to intercept out of the tax receipts otherwise payable to the government whatever sum is required to make up the full quota of the railway obligation.

Organization of the New Company

The scheme outlined above was promptly approved by the reparation commission and accepted by the allied governments. Thereupon the reparation commission appointed, as proposed by the expert committee, an "Organization Committee of the German Railways," whose function should be to work out the scheme in detail, and, in particular, to draft the law and the concession by which the Reichstag would transfer the operation of the railways from the State to the new organization.

In the last days of July the final draft was ready. The German government formally signified its acceptance; the reparation commission formally approved; and on August 29 the drafts were passed into law by the requisite majority of the Reichstag.

On the following day the protocol of the London conference placed on record that the law had been passed and that without allied consent its provisions could not be changed by subsequent legislation.

The new company, as a legal entity, came into existence the day after the new law was promulgated. And the necessary steps are now being taken to organize the company, to form its board of directors that they may appoint its principal officers, and that then the management of the German railways may be transferred to them. The trustee for the bondholders has already been appointed by the reparation commission in the person of M. Delacroix, now a member of the commission, and formerly prime minister of Belgium. His first duty is to appoint nine members (one-half) of the board of management, of whom four will, it is understood, be foreign and five German. The foreign members will then have to appoint the railway commissioner. The appointment by the German government of the other nine members is in process.

The board will proceed to appoint its chairman, who must be German, to organize its business, and to appoint its director-general—i.e., general manager, for in Germany, as also in France, a "director" is not as with us, a member of a board which only meets at intervals, but a whole time executive officer. The first duty of the new general manager will be to agree with the existing head of the German railway, the minister of communications, as to the detailed conditions of transfer, and to settle an inventory of the property transferred.

The New Organization in Detail

The law constituting the new German railway company and the concession annexed thereto really form one whole and are equally binding. But whereas the law deals mainly with the external relations of the company to the Government and the public, the statutory rights of the staff, the division of the company's capital, and the rights of the bondholders the concession is concerned with the internal organization of the company itself, the functions, powers, and duties of its various organs, its financial regulations and machinery, and the special position of the two international authorities, the trustee for the bondholders and the railway commissioner.

The law begins by enacting, according to German ideas, what we in England should take for granted, that "the company shall operate the railways in accordance with business principles, due regard being paid to German economic interests." Similarly it is elsewhere laid down that "every official shall be under obligation to protect the public interests of the company"; that "the members [of the board of management] shall observe absolute discretion regarding the company's affairs," and that the executive officials "shall

exercise such care as is required from a good man of business and shall be responsible to the company for any breach of their duties."

Reich's Participation in the Shares Issue

Ordinary shares, of the nominal value of £650,000,000, credited as fully paid, are to be at once issued to the Reich, or at its request to any of the states of the Reich; but it is not contemplated that these shares can receive a dividend at the outset. Cumulative preference shares, with a right to participate in future surplus profits, are created of a total amount of £100,000,000. One quarter of these shares are to be issued as soon as may be, and the balance as and when required. Of the proceeds, one-fourth belongs to the German government and three-fourths to the company.

£550,000,000 Issue of Reparation Bonds

The time and terms of the issues are left to the company provided that, except with the consent of the government, the minimum price must be par and the maximum dividend 7 percent. Reparation bonds to an amount of £550,000,000 are to be issued forthwith to the trustee. They bear interest at the rate of 5 per cent, and as from the fourth year will have a 1 per cent sinking fund attached to them. But for the first three years the company is only required to pay respectively £10,000,000, £29,750,000, and £27,500,000 instead of the full amount (including sinking fund) of £33,000,000 needed for the service of the entire issue.

These bonds are secured by a general first charge mortgage on the whole railway property, movable or immovable, and rank before any existing mortgages that may be in force. Further, as has been said, they are guaranteed by the German government, and in the last resort have a lien on all funds—and they must be large—which come into the hands of the commissioner of controlled revenues on account of the German government.

The concession gives to the company possession of the railways and the right to work them, with protection from competition, for a period of 40 years. The period can be shortened if the government finds money to pay off all the bonds earlier. It is prolonged indefinitely if they have not been paid off at the due date. The company continues to pay the transport tax; but its proceeds up to a sum of £12,500,000 a year go not, as heretofore, to the government, but to the agent for reparation payments. The company is relieved from the obligation to carry mails and post parcels gratis, and will in future be paid for the service at commercial rates. Hitherto the railways have hardly paid any taxes, either federal, state, or local, and the law continues this exemption to the new company.

Railway Staff Lost State Bank

Hitherto nearly half the railway staff have ranked as state officials (*Reichsbeamte*). For example, an engine driver is a *Beamte*, his fireman is only an employe. And the prestige of a *Beamte* is quite important. In future the railway staff will cease to be *Reichsbeamte*. But they will be entitled to the designation of *Reichsbahnbeamte*, and will enjoy substantially all their old rights and privileges, pensions, and so forth. There is a special provision in the law—there is a corresponding provision in the law constituting the new bank—that the company shall not increase the salaries of its staff, other than its superior officials beyond the government standard of payment, without coming to an understanding with the government, lest the repercussion of the increase should imperil the state budget. But an appeal is provided for if an agreement cannot be reached.

The experts' report laid down that:

"The German government shall have such control over the tariffs and service of the railways as may be necessary to prevent discrimination and to protect the public, but such control shall never be exercised so as to impair the ability of the railroad company to earn a fair and reasonable return on its capital value, including adequate provision for its bonds and preferred shares, a return on its ordinary shares, and adequate reserves for all purposes including amortization of capital. The plan to accomplish the foregoing shall be worked out by the organization committee."

The task of the committee was therefore to embody this general idea in the precise language of a statute. It is impossible in brief space to summarize the result except in the barest outline.

Broadly, it may be said that the new law gives to the German government control over the tariffs and service of the new company, greater than that of the government in this country but less than the control often exercised by the government in other continental countries. For example, under the law no rate or fare can be changed without government consent, and even the time tables of the trains must be submitted for its approval, an obligation which to English companies would seem intolerable.

Company Must Earn Adequate Revenue

On the other hand, the powers of the German government are subject to two very important limitations: the government control must not be so exercised as to prevent the company from earning a net revenue adequate to meet its obligations; and, further, there is in every case a right of appeal. The appeal is in the first instance to a special German tribunal of three members, a judge as chairman, and one representative each of the government and the company. If either side is dissatisfied with the decision, a further appeal can be taken to an arbitrator appointed by the president of the International Court of Justice, and his decision is final. Moreover, even on the supposition that the company neglects to assert its rights, the railway commissioner can invoke arbitration on his own account.

Foreign Members on Managing Board

To turn from the rights and obligations of the company to the form of its organization: There is to be, as has been said, a board of management of 18 members, half appointed by the government and half by the trustee for the bondholders. The trustee half must contain at least four foreign members.

As and when the preference shares are issued, for each £25,000,000 issued the preference shareholders will have a right to nominate one member of the board, in replacement of a member representing the German government. And when at least three preference shareholders have been appointed the chairman will be selected from among them; but he must be of German nationality. The whole of the 18 members are required to be either business men of experience or professional railway men. No member of any legislature or of any government, whether federal or state, is eligible for appointment. The normal term of office of a member of the board is six years, and he is eligible for re-appointment. The chairman of the board is elected each year by a three-quarter majority.

The powers of the board, which are substantially similar to those of an English or American board, are specifically enacted under the concession. This is necessary in view of both the general laws and the prevailing customs of Germany. In England we take it for granted that the board of directors is supreme. A general manager, however great may be his power in practice, is, in theory, merely the head servant of the board, bound to conform to their orders. In Germany, on the other hand, what we call the board is usually little more than a supervisory council, *Aufsichtsrat*. The real power lies with the directorate (*Vorstand*), which may be a single person, but is usually a body of three or more, of which the president may be the ultimate authority, or may be only *primus inter pares*.

The organization embodied in the new railway concession is in fact a compromise between Anglo-Saxon and German ideas, designed, on the one hand, to protect the rights of the bondholders in the method to them familiar, and, on the other hand, not to diverge too far from the normal framework of a German company's constitution. The directorate, in which in this case the director-general is unquestionably the ultimate authority, can only act in the name of the company within definitely prescribed limits. The director-general is to be appointed for a period of three years by a three-fourths vote of the board, and he and his colleagues must be of German nationality.

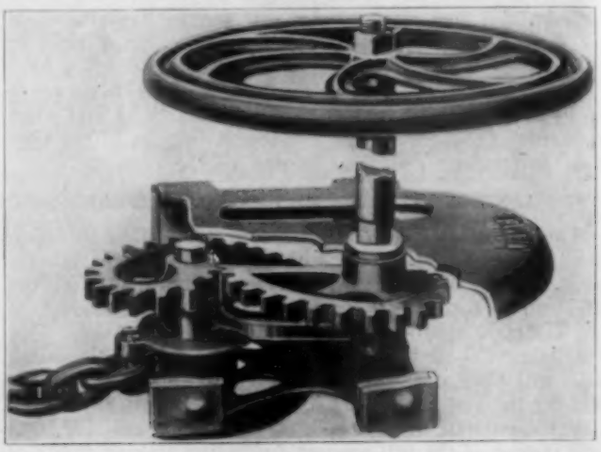
It only remains to describe the functions of the railway commissioner. He must be a person accepted in the railway world as being in the front rank. His essential function is to watch over and protect the interests of the bondholders. He will have an adequate staff of technical assistants in the various branches of the railroad profession, and will possess the right of access to all places at all times for himself and his staff, and the right to inspect all documents, and to call for all further information that he may require. So long as things go well, his function is solely to supervise.

But if things go wrong or even seem to be going wrong, powers of inspection gradually pass over into powers of control. If payment of the due interest fails, he can order expenditure to be reduced or tariffs to be raised, and may even require the resignation of the director-general. If payments are in arrears for six months, he may himself take over the operation of the railways and sell any property of the company not necessary for their operation. In the last resort—but in this case only after the decision of the arbitrator appointed by the President of the Court of International Justice—he may transfer the concession to a new lessee.

Hand Brake with Quick Take-Up and High Force Ratio

IT IS GENERALLY recognized that besides simplicity there are two fundamental, opposing requirements of the efficient hand brake; namely, the ability to take up slack quickly and yet give a powerful brake application when the shoes are in contact with the wheels. These requirements have been met by a unique arrangement of cam gears in a new hand brake for freight cars, developed by the Jemco Products Company, Chicago. This brake, known as the Jemco power plus hand brake, is shown in one of the illustrations applied to an automobile car and in the other illustration with the housing cut away to give a view of the helical gears. An examination of the latter illustration will indicate that in release position the ratio of movement of the brake wheel and shaft is approximately one to three of the shaft on which the brake chain is wound. In other words, slack in the chain and brake rigging is taken up rapidly when the brake wheel is turned through the first one-quarter or one-half revolution. Continued turning of the brake wheel increases the brake shoe pressure until, at approximately 1¼ turns, the ratio of one to three has changed to three to one and a pressure is obtained between the brake shoes and wheels equivalent to that afforded by 50 lb. air pressure in a 10-in. air brake cylinder. This is assuming a pull of 125 lb. on the brake wheel.

The Jemco hand brake can be fully applied without the aid of a brake stick in 1½ seconds and comparative tests indicate the advantage of this brake over the ordinary type of hand brake with sheave wheel. In a specific test it is reported that two composite gondolas, loaded with coal and having a total weight of about 160,000 lb. each, were coupled together in a freight classification yard and handled as a unit over a "hump" with a 2¼ per cent grade. One car was equipped with a Jemco and the other with an ordinary hand brake. The cars were allowed to obtain full momentum in a distance of 1,048 ft., the rider than applying the brake and stopping the cars in the shortest distance possible. The distance traveled to a full stop after the application of the ordinary hand brake was 2,078 ft., and the time required in making the stop was 1 minute and 52



Housing Cut Away to Show the Helical Gears in Release Position

seconds. The test was repeated, applying the Jemco hand brake. In this case the distance traveled was 1,400 ft. and the time 1 minute and 15 seconds. As a result of this and other tests, a large number of Jemco brakes have been applied to new and old freight cars and are now in service on several roads.

The Jemco brake is simple in construction and may be easily applied. It can be slipped over the lower end of the

Jemco Power Plus Hand Brake Applied to Automobile Car

brake mast and the housing secured to the end sill, replacing the ordinary stirrup. The gears are effectively shrouded and supported by the malleable iron frame which not only shields them from damage by falling lading but protects them from ice and snow. All multiplying levers, sheaves, etc., are eliminated. The brake when set by hand is said to be practically as tight as it could be set with a club. The proportions of the helical gears used can be so made as to give any desired braking power.

Railway Fire Protection Association Meeting

A Vigorous and Growing Association—Increasing Recognition of Its Importance—J. R. Peters Elected President

THE RAILWAY FIRE PROTECTION ASSOCIATION held its eleventh annual meeting at the Hotel Jefferson, Richmond, Va., on October 21, 22 and 23, with President G. R. Hurd (Illinois Central) in the chair, and an attendance of about 200. The members were welcomed by E. Lee Trinkle, governor of Virginia, and J. F. Bright, mayor of Richmond. The attendance at this meeting included a very considerable number of guests; and in addition about fifty members had with them their wives.

President Hurd, in his opening address, congratulated the association on the good work that it has done during the past year. Regional meetings have been held by eastern members in New York and by those of the south in Atlanta; and the president recommended the holding of similar district conferences in the west and the southwest; a very suitable means of keeping alive the interest in the association between annual meetings. The membership now numbers 270, including 95 associate members. Mr. Hurd congratulated the railroads on having shown a reduction of $1,182,000 in their fire losses in 1923, as compared with 1922. But, whatever the change in totals, the record is still large and it is to be remembered that 85 per cent of the fires are from preventable causes. He exhorted all railroad employees to remember that keeping clean houses is a never-ending duty. "Clean houses do not burn."

W. F. Hickey (N. Y., N. H. & H.), chairman of the Committee on Publicity, reported that the quarterly "News Letter" of the association had been successful and popular, and he called on members to see that news items which ought to be published in that pamphlet be sent promptly to the chairman. Mr. Hickey believes that the secretaryship of the association is important enough to warrant the employment of a man to give to the office the whole of his time.

The principal address of the first forenoon's session was that of F. H. Wentworth, of Boston, representing the National Fire Protection Association, his subject being "The Next Step in Fire Protection." He reviewed the earlier steps, beginning with the activities of his association, 30 years ago, and recalled how slowly the owners of buildings and the public authorities had learned the lessons of fireproof partitions, standard screw threads for hose, and other essentials; and called for more energetic and intelligent application to the problems of today. In fire prevention the railroads and the cities must work together, and a primary desideratum is to inform and educate the public. His association had been greatly helped by the national association of credit men which has local organizations in scores of cities. The credit men are actively interested in the prevention of fires—that is, in seeing that merchandise is not destroyed before they get their pay for it! Mr. Wentworth advocated united efforts to so educate fire departments that all members shall not only put out fires, but prevent them—this by acting at all times as inspectors of property. In Cincinnati, Ohio, this idea was put in practice, with such a reduction within four years, in the losses from fire, that the insurance companies made large reductions in their rates in that city. Mr. Wentworth has appointed a field secretary, Percy Bugbee, in whose work he asked for the co-operation of the railroads. The meeting voted approval and commendation of this amplification of the work of the "N. F. P. A." The Cincinnati idea is making progress elsewhere, and remarkable results were reported from Indianapolis, Ind.

On Tuesday afternoon R. S. Marshall (C. & O.) read a paper on the general fire prevention problem as it presents itself to the railroad executive. The cultivation of the personnel is the great point; that is, train your employees. For complete protection they must "think safety" every hour of the day. The fire prevention engineer must seek the active co-operation of trainmasters, road foremen of engines, yardmasters and other supervisory officers. These supervisory officers must educate all employees in the rules of safety as applied to all combustible property. The president of every large railroad should establish a fire prevention committee or board with representatives from each of those departments wherein there is any fire hazard. Such a board should hold meetings regularly. By it the fire-prevention engineer can keep in touch with all departments. On a road having as many as 30,000 employees such a board should have a secretary to devote his whole time to the office.

Mr. Marshall cautioned fire prevention engineers not to devote themselves mainly to insurance; their duty is to lock the door before the horse is stolen. He would have formal investigations of all the more serious fires; employees attending such inquiries would go out and educate their fellows.

Statistics of railroad fires in 1923 as reported by 76 railroad (embracing probably 95 per cent of all railroad fire losses) were summarized by the Committee on Statistics, J. H. Yelton (A. C. L.) chairman. As mentioned by President Hurd there was a large decrease in the total loss, but certain items continue large. An increase of 129 fires or $1,353,691 under the head of smoking is termed by the committee "an astonishing figure." The total under "cause unknown" has been reduced, but is believed to include numerous cases where the cause might be known—by diligent inquiry.

The Committee on Forms, W. C. Neely (N. & W.) chairman, recommended standard forms for (a) preliminary report of fire (which should show enough to indicate whether or not an investigator should be sent out); (b) report on fires adjacent to railroad premises (recording facts which would be needed subsequently if the loser should conclude to sue the railroad); (c) for collection of insurance, and (d) various forms for surveys, inspections, etc. Printed forms were not submitted, and this report was accepted as one of progress only.

Storage of Records was the subject of a long report from a committee of which A. D. Brooks (N. Y. C.) is chairman. This also was accepted as a report of progress, and the subject referred back with instructions to report on methods of taking care of records at (1) general office buildings, (2) division and shop offices, (3) station buildings. The committee's recommendation of the use of basements for storage of records was criticised by a number of members.

Fire alarm signaling systems were the subject of a brief committee report, deWitt Rapalje, chairman. This consisted mainly of descriptions of the different systems—manual, automatic, sprinkler, telephone combinations, whistles, bells, etc. Many questions being asked, the report was recommitted.

The committee on Handbook, T. E. Chapman, Jr. (N. & W.) chairman, presented a brief report naming the subjects which it proposes to embody in a handbook for the association, the substance of the matter to consist of reprints of reports which have been made to and approved by the association. These include essays on how to prevent fires and on care of property with classification of hazards—

enough to fill two or three hundred pages. After a little discussion, which included some arguments for more deliberation and for bringing a complete synopsis of proposed contents before the association before ordering the publication of a book, the meeting voted unanimously to instruct the committee to have the proposed matter put in type with a view to laying before the next annual convention full proofs of what the committee (with the co-operation of the executive committee) decides to use.

An Inspectors' Session

Wednesday forenoon was mostly taken up with a "general discussion," as set forth in the program but which was started by a half dozen short papers read by inspectors—not chief fire prevention officers—responding to an invitation from the president, circulated last month, to compete for a prize of ten dollars (second prize $5) for essays on "results." In other words, each contestant was expected to present facts or arguments to justify his employees in paying him his salary. These essayists were classified alphabetically by roads and the first was by W. J. McGrath, of the Delaware, Lackawanna & Western. He outlined the organization and the work of his department.

A fire prevention board, appointed by the president and consisting of five chief officers (including the controller) keeps close watch on all activities and there are division boards of similar character. Minute records are kept of all fires, fire drills, inspections, condition of chemical apparatus, etc.

On piers the employees are drilled weekly and in the shops bi-weekly. Automatic systems are inspected daily. The chief and his assistant make varied inspections every week. The best fire preventive "appliance," in Mr. McGrath's opinion, is a man, with a shovel and a broom. The most obstinate difficulty that he has to deal with is the careless user of cigars and cigarettes—who, however, is, usually, not an employee. He has abated this nuisance a little by securing convictions in court with fines of $5 to $25.

In such a competition the different speakers must of course, largely traverse the same ground, and from the essays following Mr. McGrath's we can take only a few characteristic paragraphs; which course also is justified by the fact that substantially all of these were read in tones so low or indistinct that to half of the audience they were practically inaudible. But the papers contained much useful matter and were ordered printed in full in the proceedings. The first prize (awarded by a jury of seven past presidents) went to G. H. Scott, an insurance inspector of the New York, New Haven & Hartford, New Haven, Conn., and the second to E. Williamson, Southern Railway, Atlanta, Ga. One of the best papers was that of W. S. Wicker, special representative of the Mobile & Ohio, who was heard and was given favorable mention but was held to be not eligible for a prize, not coming within the class to which the prize was offered.

Most of the speakers emphasized the importance of the personnel. The chief has done a good day's work when he has convinced one employee of his individual responsibility as to fire prevention. Printed instructions, advice and diagrams should be posted on walls of offices, lobbies, etc. On one road the greatest difficulty is "to keep up our courage"; managing offices do not manifest much appreciation of the work of the fire prevention engineer. One speaker said fires caused by careless users of tobacco are increasing. Mr. Williamson (Southern) exhorts trainmasters and other officers who come in intimate contact with employees to be careful always to set a correct example in this matter.

A most important specific duty of a fire inspector is always to get, at every important point, a local man—as high an officer as can be got—to go around with him.

Consider very carefully every formal recommendation; one foolish one will neutralize 100 good ones. Make each report short, clear and terse. The wise manager, however, will deal very sympathetically with well-meant suggestions, from high or low, even if not usable. On the New Haven, the fire inspectors attend all safety-committee meetings, and there tell of all recent fires on the road.

In the west where oil is used for fuel that is one of the chief hazards. On the Los Angeles & Salt Lake (Union Pacific) 40-gallon foamite extinguishers are being installed at shops and other important localities.

The temptation to tolerate unsafe conditions in or around a building because the structure is classed as temporary, must be guarded against; such buildings often prove to be very long-lived. Stored freight cars constitute a serious risk. Car doors should be kept closed. In some situations steel coal cars should be so placed as to serve as fire breaks.

In the discussion following these essays cotton risks were prominently mentioned. Accidents in cotton gins some times result in the shipment of bales containing fire. The gins should be required to hold for ten days all such suspected bales. Where a fire results from carelessness in connection with a car loaded by a shipper, one road not only refuses to bear the loss on the lading, but calls upon the shipper to pay the loss on the car.

On the New Haven certain switching engines are to be equipped with the "Ohio regulator" by means of which quick connection can be made with fire hydrants. Experience was cited by one road where one fire fighting switcher was equipped to quickly borrow water from other engines' tenders thus saving time as compared with going to tank.

One member reported unsatisfactory conditions in connection with tire-heating. Evidently few roads have all this work done out of doors. In one shop it is done on a wooden floor.

In one place where a concrete floor was provided the floor *exploded*. The member reporting this was assured that with well-seasoned concrete no such thing would happen.

Wednesday afternoon was largely taken up with an address by Ira G. Hoagland, secretary of the National Automatic Sprinkler Association who showed a great number of stereopticon views of buildings, burning and otherwise, illustrating his statistics—also shown on the screen—showing for 27 years the highly successful results of the use of automatic sprinklers, both wet and dry; and by a motion picture exhibit displaying the virtues of the "protectoseal" a device like a miner's lamp, to be used on storage tanks, automobiles, etc., to prevent disaster due to flame coming in contact with gasoline.

The meeting adjourned at four o'clock to take a sight-seeing excursion around the city in forty automobiles given (and driven) by leading members of the Chamber of Commerce; and this municipal hospitality was in addition to an appropriation of money by the city government. The association's chairman-of-arrangements-committee was C. C. Michie, assistant secretary of the Chesapeake & Ohio.

Thursday

Timber treating plants was the subject of a comprehensive report by a committee of which G. S. Giles (U. P.) was chairman, treating in detail of the nature and history of creosoting and the construction of treating plants; fire hazards and how to guard against them. This report was accepted without discussion.

The committee on revision of the fuel oil report made in 1919, E. J. Tallichet, chairman, presented a brief report of progress.

The report of the committee on grain fumigation, J. T. Pratt, chairman, was read by J. L. Rice (Reading). It dealt mainly with the risks incident to the use in box cars of poisonous chemicals; and a brief discussion ensued on ways of dealing with shippers to insure safe practice in this work. The Bureau of Chemistry, Department of Agriculture, Wash-

ington, is promoting the use of a harmless fumigant and has recently issued a circular on the subject.

A paper on "Watchman Service," by W. F. Steffens (New York City) the last formal paper of the meeting, elicited warm commendation. With great care and attention to all details the speaker described the qualifications of the watchman (of buildings to guard against fire and robbery), the duties of executives in seeing that efficient service is rendered, and various schemes for insuring constant vigilance and keeping adequate records, and checks to cope with the shirking watchman. Mr. Steffens cited the case of a large railroad terminal where a system of telephone reporting and registration is in use. At a certain large shop a corps of watchmen have their tours interlocked. The watchman himself may be a hazard, as, for instance, if he is careless with matches. After the first round of the night watchman, as at large shop plants, it may be advisable to lock up some of the buildings. Occasional surprise tests promote efficiency. Every watchman should be trained to go, automatically, to the fire alarm box before doing anything to extinguish a fire.

The committee on Fuel oil on water made a brief report of progress. The nuisance of oil on the waters of New York Bay, befouling piers and causing some fire risk and inconvenience, is not quite so bad today as was described in previous reports. This oil nuisance is caused mainly by oil-burning ships which pump out refuse oil with the water in emptying their ballast tanks; and progress is being made in convincing ship owners that the oil can profitably be separated from the water and saved. From 1,600 tons of water ballast 32 tons of usable oil has been recovered. The discussion of this report led to a brief reference to dock fires from other causes than oil. A recent costly ferry fire was caused by friction of a large ferry boat against the side of a new slip. New York members reported that all ferry slips there are regularly greased; the grease is considered an essential to efficient and safe service.

A proposal to change the constitution to allow the members present at the last session of each annual meeting to select the place at which shall be held the next annual meeting was briefly discussed, but was rejected 37 to 27. The majority believed that the executive committee performs this duty satisfactorily. Eleven cities had recommended themselves for the honor in 1925.

The election of officers for the ensuing year resulted in the choice of J. R. Peters (Pennsylvania) for president, C. C. Michie (C. & O.), vice-president, and R. R. Hackett (B. & O.), Baltimore, Md. (re-elected), secretary and treasurer.

Exhibits

American La France Fire Engine Company, 250 West 57th Street, New York; represented by H. P. Williams.—Rough-rider and Alert fire extinguishers.

American Wood Impregnating Co., 25 Broadway, New York; represented by J. K. Sloan and E. J. Clark.—Specimens of ties and other wood preserved by Wolman salts.

W. D. Crumpton & Co., 8 Bridge Street, New York.—Baker temperature indicaters.

George W. Diener Mfg. Co., Chicago.—Diener fire extinguisher and Diener recharge signal.

Fyr-Fyter Company, Dayton, Ohio.—Fire extinguishers.

Protectoseal Co., 53 West Jackson Blvd., Chicago; represented by R. J. Auschicks and C. R. Peck.—Protectoseal products.

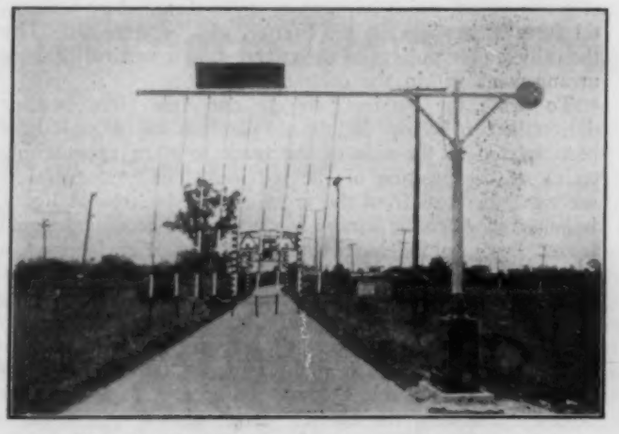
Pyrene Mfg. Co., Newark, N. J.—Pyrene and Phomene fire extinguishers; the "Fireklok" automatic alarm.

GOWANDA, NEW YORK, a town on the Erie Railroad, 31 miles south of Buffalo and 35 miles north of Jamestown, last week celebrated the fiftieth anniversary of the arrival of the first passenger train in the town. J. E. Van Dusen, station agent, has held that position from the beginning, and was the guest of honor at a dinner on Friday evening. The feature of the holiday was a parade. With the idea of giving emphasis to the fact that very old times were being celebrated, the parade was made up in part of ox teams; and among the participants were two women, past 90 years of age; one riding in "the first Ford sold in the county" and the other in "another ancient vehicle."

Yielding Barrier for a Highway Crossing on North Shore Line

WITH THE INSTALLATION of an automatic highway yielding barrier and "whiplash" at a crossing near Racine, Wis., the Chicago, North Shore & Milwaukee has tried a new development in an effort to solve the troublesome grade crossing problem.

The device consists of the barrier proper, which imposes an absolute stop on the approach of a train and a warning signal known as a whiplash, which furnishes a preliminary signal that the barrier is in the stop position, or about to be lowered to the level of highway traffic, because of an approaching train. When there is no danger from an approaching train, the whiplash, so-called because of the bamboo-covered tendrils suspended in front of the motorist, swings around to a position parallel to the road.



Warning That Barrier Is About to Be Lowered

By striking the windshield and top of an approaching car, with a clatter intended to bring a thoughtless motorist quickly to his senses, the tendrils of the whiplash, which are small flexible steel cables covered with painted bamboo sticks, provide an advance warning of the approaching danger. If the warning given by the whiplash is properly heeded there is no danger of running into the barrier, ample braking distance being provided between the whiplash and the barrier. Mounted on top of the whiplash, is a sign reading "TRAIN COMING," which becomes illuminated when the whiplash begins to turn across the highway.

If the whiplash warning is not heeded, the motorist will

Barrier Gate with Cable Barrier in Raised Position

be confronted with the absolute stop indication displayed by the barrier, which consists of three heavy steel cables lowered across the road and running into strong steel supporting columns on each side of the road. These cables are shown in the raised position. The large upright supports are firmly anchored in concrete bases and strongly reinforced across the top, with a structural steel framework, which in addition to insuring stability contains the electric motor which operates the barrier. The cables have fastened between them small pieces of canvas, painted in diagonal black and white stripes to attract the eye. By means of a braking action developed within the steel columns, the cables operate to stop any object which happens to strike them. Any horizontal force acting against the barrier, will be transmitted, by the cables, over pulleys in the columns, to a vertical braking arrangement within the columns.

To make the barrier complete and free from possible danger in case of any failure of operation, two signals have been erected at the side of the track to warn approaching trains of the position of the barrier. The first signal is set some distance from the crossing and by colored lights, indicates whether the barrier is working. The second signal is set closer to the barrier and if the barrier is down a green light shows. If a failure occurs a red light shows.

The operation of the yielding barrier is entirely automatic. It is controlled as are other automatic highway signals, through the medium of track circuits which when shunted by the approach of a train, set the machinery of the barrier in motion. A southbound train enters the track circuit controlling the barrier, at a point 5,400 ft. north of the crossing. Four seconds after the entrance of a train the whiplash is automatically placed in operation, and 15 seconds later the barrier is started downward, reaching the ground in 10 seconds. Figuring that it takes 30 seconds for the barrier to assume the stop position and allowing 60 seconds as the time required for the train to reach the crossing, there is a period of 30 seconds from the time the barrier reaches the stop position until the train reaches the crossing. At the time the barrier is set in motion, a large gong is rung and an illuminated red sign bearing the word "stop" is flashed on. In addition to this, two red lights are flashed on and off and an advertising sign, "North Shore Line," is illuminated in white while the barrier is in operation.

In a test, a passenger automobile traveling about 60 miles an hour was run into the barrier and was gradually stopped within 30 ft. without any injurious shock or jar. A heavy truck was effectively brought to a stop within a safe distance from the tracks, even though no attempt was made to shut off the power after the barrier was hit.

The barrier and whiplash are manufactured by the Highway Yielding Barrier Company, a Chicago corporation.

Insulating Lumber for Refrigerator Cars

A new insulating lumber, known as Celotex and developed by the Celotex Company, Chicago, is adapted to use in the building trades as sheathing, exterior finish, plaster base and roof insulation. Celotex of lighter density is also being introduced extensively in the railroad field, particularly as the insulating medium in refrigerator cars and steel cars. About 20 million sq. ft. are now in use in refrigerator cars owned by six railroads and eight car companies.

Celotex is an insulating lumber made from sugar cane fibre, known as bagasse. During the course of manufacture the cane fibre is firmly interlaced and felted into a strong insulating board. The strength of the material is derived solely from its structure as it does not contain any adhesive. The material comes in sheets ½ in. thick and of any size to meet the car builder's specifications.

The tensile strength of Celotex is 373 lb. per sq. in., and a board 12 in. wide, with supports 16 in. apart, will deflect 13/16 in. under a load of 158 lb. Tested as a sheathing

Side Walls and Ends Insulated with Four Layers of Celotex

material applied to studs, in comparison with ¾-in. by 6-in. yellow pine boards, Celotex shows six times as much resistance at the point of initial deflection, and nearly twice as much load at the point of failure. Heat transmission tests at the Armour Institute of Technology by the flat plate method are indicative of the insulating quality of the material. These tests are reported to have shown a con-

Celotex Used for Roof; Also Floor Insulation

ductivity of 7.91 for Celotex as compared to 7.4 for pure corkboard, 8.3 for rock cork, 10.4 for pulp board and 19 for white pine. In other words, Celotex has roughly three times the insulation value of white pine. It weighs 13 lb. per cu. ft. or only one-third as much.

When used in refrigerator cars Celotex performs two functions, providing insulation and taking the place of the blind lining. It is applied directly on the car frame and all blind lumber is omitted. The index figure 7.91 means that only .33 B.t.u. per sq. ft. per in. thickness per deg. F. difference in temperature will be transmitted through Celotex in one hour. Any number of layers may be applied to build up the particular insulation value which the car builder desires.

Celotex may be used as the sole insulating material or in combination with other materials. It is designed to be highly resistant to moisture so that it will not deteriorate even under water pressure. It is waterproofed during the process of manufacture.

An advantage of Celotex when used as floor insulation is the possibility of arranging the material in laminated layers one over the other, avoiding continuous joints in the floor. Further advantages of Celotex are its ease and consequent low cost of application. No special tools are required as it can be sawed like lumber.

Pennsylvania Objects to Four-System Plan

President Rea in Statement Offers Alternative Suggestions and Asks Greater Heed for Property's Needs

Following publication of a general outline of the four-system plan for the consolidation of the eastern trunk lines, as suggested to the Interstate Commerce Commission on October 11 at a conference with the executives of four eastern systems, there has been made public a statement made at the time by President Rea of the Pennsylvania objecting to many features of the plan on which the executives of the other three systems were in general agreement.

"I regret that I cannot be in accord with the suggested four-system plan for the eastern railroads as presented by my associates," Mr. Rea said in the conclusion to his statement. "No hurt to the public can possibly materialize by making suitable allocation of lines for consolidation purposes, that would reduce the present number of systems, providing the allocation is so equitable as to preserve reasonable competition and the natural traffic routes and industrial relations that have been built up slowly step by step during 70 or more years. Widespread severance and disruption of those relations would be caused by the adoption of the four separate systems plan as presented to the commission.

"I am unable to see," Mr. Rea also said, "that the plan suggested affords any substantial basis for believing that, thereby, the railroads of the eastern district will be able to render a better or cheaper transportation service, or gives any assurance that the systems proposed to be created will, by reason of their relative financial strength, be enabled to afford to the shippers and others interested that competition which the transportation act was designed, among other things, to preserve."

Taking the results of operation in 1923 as a basis, Mr. Rea said, the return on the property investment of the several systems proposed would be as follows: System No. 1, New York Central, 6.11 per cent; System No. 2, Pennsylvania, 4.21 per cent; System No. 3, Baltimore & Ohio, 4.84 per cent; System No. 4, Nickel Plate, 4.76 per cent. "These figures would seem to indicate," he said, "that the Pennsylvania Railroad system ought to be strengthened and supplemented, even if to accomplish this it is necessary, as it would be, to exclude from the other systems lines whose earnings, if included in the Pennsylvania system, would tend to equalize the rate of return on the property investment of each system.

"When we come to examine the proposed grouping, it will be apparent that it is largely based upon the assumption that the Pennsylvania Railroad system as it exists today ought to be treated as complete in itself," Mr. Rea continued. "In the plan submitted, if we except some trackage rights, the only additions which are suggested are the Chicago & Alton, east of St. Louis and Springfield, and the Grand Trunk—Western lines."

The value of these additions is questioned by Mr. Rea who says, "There is nothing to indicate that the inclusion of a portion of the Chicago & Alton would be of any material assistance to the Pennsylvania system either in the development of traffic or in the handling of it. For instance, why should not the Chicago & Eastern Illinois have been allocated? The traffic interchanged between the Pennsylvania and the Chicago & Eastern Illinois (which is assigned to the other systems) was 3,992 loaded cars and 2,789 empty cars during the month of March, 1923, and with the Chicago & Alton was 858 loaded cars and 589 empty cars. The total yearly interchange, based on these figures, would amount to 47,904 loaded and 33,468 empty cars in the case of the Chicago & Eastern Illinois, and 10,296 loaded and 7,068 empty cars in the case of the Chicago & Alton. This would indicate that the Chicago & Eastern Illinois is a more essential line to attach to the Pennsylvania system than the Chicago & Alton.

Grand Trunk, Western Lines

"The four-system plan proposed that the Grand Trunk—Western lines would be included in the Pennsylvania system but that its terminals in Detroit and Toledo, viz: the Detroit & Toledo Shore Line and the Detroit Terminal, would not be included. The Detroit & Toledo Shore line is assigned jointly to the Baltimore & Ohio and Nickel Plate systems, no disposition being made of the Detroit Terminal.

"The Nickel Plate system may not require its one-half interest in the Detroit & Toledo Shore line," said Mr. Rea, "because there is to be associated in that system the Pere Marquette, which provides the route for it to reach Detroit. The Pennsylvania system now has trackage rights over certain parts of the Pere Marquette and the Wabash to enable it to reach Detroit, but would require the other allied roads and terminals now held by the Grand Trunk system of Canada to assist in supporting the Grand Trunk Western lines and handling their business."

Lehigh Valley

The Lehigh Valley is included in the New York Central system in the four-system plan. "The exchange between that line and the Pennsylvania is so large," Mr. Rea points out, "that its attachment to any other system would result in the disruption of a great part of the traffic that has been flowing through regular trade channels in the exchange between it and the Pennsylvania for many years. Its allocation would give the New York Central three entrances in the city of New York, viz: by its own main line, the West Shore, and the Lehigh Valley. Indeed, as the New York Central system is also to include the New York, Ontario &

Western, which has entrance rights into New York via the West Shore, the proposed plan would give New York Central a fourth entrance into the city and port of New York. This certainly could not be done without materially suppressing competition, besides driving traffic from its accustomed channels. It must also be remembered that the Lehigh Valley, prior to extending its own line to Jersey City, enjoyed the use of the Pennsylvania tracks and terminals to reach Jersey City and New York, and in recent years has been using the Pennsylvania tracks from west of Newark into New York and Jersey City and the Pennsylvania system's passenger stations. Its chief freight terminal adjoins the Pennsylvania system freight terminals at Greenville, N. J., that the two roads connect in the Pennsylvania-Schuykill region where the Pennsylvania railroad enjoys trackage over parts of the Lehigh Valley and the Lehigh Valley over the Pennsylvania; that the Lehigh Valley and the Pennsylvania operate cooperatively central Pennsylvania passenger trains via Easton, Allentown, Mount Carmel, Sunbury, Tyrone and Johnstown to Pittsburgh.

"If any conclusion is to be drawn from the past experience it would seem that the association of the Lehigh Valley with the Pennsylvania system should be continued. In the month of March, 1923, the Pennsylvania system exchanged with the Lehigh Valley 14,700 loaded cars and 7,030 empty cars. If one year be based on these figures it would mean 176,400 loaded cars and 84,360 empty cars, or one of the largest interchanges carried on with the Pennsylvania system. Further, the Pennsylvania system is in need of a more direct line and better facilities between New York City district and Buffalo and points beyound. This could be supplied by the Lehigh Valley. The Pennsylvania's route between Buffalo and New York via Trenton-Philadelphia and Harrisburg is indirect, for the traffic must be moved so far to the west via the Pennsylvania connection, before it moves north to Buffalo. The distance from New York to Buffalo via Pennsylvania system is 506 miles as against 447 miles via the Lehigh Valley, and 396 miles via the Lackawanna system."

Referring further to the Lehigh Valley, Mr. Rea said that "the allocation of the Lehigh Valley to the Pennsylvania, giving a direct line to Wilkes-Barre, Pa., where it connects with the Pennsylvania, and thence north to Buffalo, would also act as the trunk for a direct east and west railroad needed by the Pennsylvania system along the great lakes between Buffalo and Toledo hereinafter alluded to, or trackage instead of a new line between such points. The Lehigh Valley would also be a valuable line to enable the direct movement of east and westbound traffic as against the present longer main line of the Pennsylvania from New York via Trenton and Philadelphia and Harrisburg to Sunbury and central Pennsylvania and northern New York. A glance at the Pennsylvania system map will show the necessity of that system having such a line, which would take the concentration of its traffic to and from the lake ports and northern New York and that which flows via its Allegheny Valley line as far west as the Pittsburgh district, and centers in the Sunbury district, direct from that big territory into New York via the Lehigh Valley, rather than via Harrisburg, Philadelphia and Trenton into the city of New York. In effect it would be a northern route for the Pennsylvania system traffic via the Sunbury district to and from New York. The Pennsylvania railroad mileage from Sunbury, via Harrisburg, to New York is 248 miles as against 210 miles via the Lehigh Valley, or as against 216 miles via the Lackawanna, which could also be used for the foregoing purposes if the Lehigh Valley is not allocated. I have not attempted to point out all the benefits that would result from the inclusion of the Lehigh Valley with the Pennsylvania system, but only some of the most important ones. If the Pennsylvania system is allocated either the Lehigh Valley or the Lackawwana, it would save the expenditure of much new capital on the Pennsylvania main line between New York and Harrisburg."

Other pertinent parts of Mr. Rea's statement follow:

Reading-Jersey Central

"System No. 3—Baltimore & Ohio. My statement for the Pennsylvania Railroad System in May, 1923, page 16, clearly stated the necessity for the preservation of open gateways. I then pointed out that while the Reading and Pennsylvania are competitors in eastern Pennsylvania, the Pennsylvania is dependent upon the Reading for a large tonnage of anthracite coal, and the latter has 50 points on its system at which the Pennsylvania exchanges loaded and empty cars. The total interchange with the Reading in the month of March, 1923, was 49,171 loaded cars and 33,017 empty cars. A year based on those figures would equal 590,052 loaded cars and 396,204 empty cars. The interchange with the Central of New Jersey for the same month amounted to 8,802 loaded cars and 5,990 empty cars, or on a yearly period based on these figures 105,624 loaded cars and 71,880 empty cars. The Pennsylvania has the deepest interest in seeing that the Reading-Jersey Central System gateways, so long established and used, are kept open and that system continued as a neutral terminal distributing railroad for Philadelphia and southeastern Pennsylvania. This system, through the proposed allocation of lines is given a direct railroad from the New York City district to Wilkes-Barre, Williamsport and the Sunbury district through eastern and central Pennsylvania. The only system left without such a direct line in this proposed four-system plan, is the Pennsylvania.

"The Pennsylvania System has only a small tonnage of anthracite coal originating on its own lines, so that if the allocation of the Reading-Jersey Central lines to the Baltimore & Ohio System, and the Lacakanna and the Erie to the Nickel Plate system and the Lehigh Valley to the New York Central, is approved, it seems that hereafter the industries along the Pennsylvania Lines will practically have to rely upon these systems to get a proper supply of anthracite, and these three systems will practically serve all points, or give the Pennsylvania such a short haul as to make it unprofitable.

Buffalo & Susquehanna and Nickel Plate

"The Buffalo & Susquehanna is assigned to the Baltimore & Ohio, although for years its traffic, chiefly coal, has been routed via the Pennsylvania Lines to the Buffalo gateway. Further, its allocation to the Pennsylvania System would save the expenditure in the future by the latter system for double tracking its own lines between Falls Creek and Driftwood. The Buffalo & Susquehanna is a relatively small road but the totals cars interchanged with it by the Pennsylvania System in the month of March, 1923, equalled 1,874 loaded cars and 1,542 empty cars. A year based on these figures represents 22,488 loaded cars and 18,504 empty cars.

"The proposed consolidation into this system of the New York, Chicago & St. Louis, Chesapeake & Ohio, Hocking Valley and Erie seems to be desirable in view of the necessity of working out another large system in the Eastern District. The suggested consolidation plan by no means stops there. The Nickel Plate system as proposed also includes the Virginian. As it is now proposed that the coal traffic attached to the Erie Railroad shall come under the control of the Nickel Plate system as well as that of the Lackawanna, the requirements of the Nickel Plate system with respect to coal traffic would seem to be fully met without also assigning the Virginian to it as the four-system consolidation plan proposes. Experience during the war showed that a considerable part of the Virginian and terminal facilities were needed as an additional line and facility for the Norfolk & Western, and that such use materially added to the efficiency and economy of movement in the war. Therefore, the Virginian should be allied with the Norfolk & Western in its entirety, or as a minimum one-half ownership and use placed with that company, and the balance with the Chesapeake & Ohio.

Lackawanna

"The Lackawanna is also included in the Nickel Plate System No. 4, thereby giving the latter a further hold upon the anthracite coal traffic in addition to that secured through the Erie, and also giving it a duplicate entrance into New York City. The total loaded freight car exchange between the Pennsylvania and Lackawanna systems in March, 1923, was 10,243 cars, and 3,772 empty cars, or basing a year on these figures the total interchange would be 122,916 loaded cars and 45,264 empty cars. The Pennsylvania also has trackage and interchange rights with the Lackawanna in the Buffalo-Black Rock District. Anything that might disrupt so large an interchange and affect such a large territory, and these results would doubtless follow if the Lackawanna should be assigned to the Nickel Plate System solely, which in addition has

the Erie, thereby giving it two east and west lines between the Atlantic Seaboard and Chicago, would not, I feel, be in the public interest nor helpful to the railroads as a whole.

L. V. & L. & N. E.

"Adhering to a four-system plan for the moment which I am not at present prepared to fully endorse, I suggest that a better allocation would be, based on traffic exchange, for the Lehigh Valley to be allocated to the Pennsylvania System, and the Lackawanna to the New York Central and the Nickel Plate jointly, provided it is shown that these two last named systems require additional lines between Buffalo and New York, and additional terminals in New York. I have some hesitation even in tentatively suggesting any disposition of roads which are now independent of the larger systems and have been efficient in their operation, without full assent and conference of their various managements, and seeing on what terms it could be done, and also to fully protect the long existing traffic routes and trade relations, but I am trying to follow the proposed four-system plan to some reasonable conclusion.

"The remaining anthracite line, the Lehigh & New England, would be greatly benefited if the coal from the mines of its owner, the Lehigh Coal & Navigation Company, could directly reach the markets on the Pennsylvania System. Its territory also needs a quant ty of soft coal so that it should be directly connected with the Pennsylvania System, not only for the exchange of coal as above indicated, but also to serve as an additional route to reach New England when the present New York gateway to the New Haven is congested, and also to take care of tonnage which can be more acceptably handled via the Lehigh & New England route, than through the port of New York. However, even that road is proposed to be jointly owned by the four systems under the plan suggested.

"The Pennsylvania System under the four-system plan is allocated trackage over the Baltimore & Ohio from New Castle and Wampum to Butler, Pa., and thence over the Buffalo, Rochester & Pittsburgh, and its Allegheny and Western Line, from Butler to Du Bois, Pa., from thence the Pennsylvania System would use its own line and the Buffalo & Susquehanna which should be assigned to it, to move the traffic to Driftwood and to Sunbury, Pa. The purpose of this trackage is to move the through traffic from points west of Pittsburgh directly to Sunbury and keep it away from the Pittsburgh gateway and the main line, so as to avoid congestion and defer for a long period a large outlay of capital for new lines. With this traffic brought to Sunbury and supplemented by traffic from Buffalo, Erie and other points in northern New York and Central Pennsylvania, also routed through Sunbury, it is most essential that the Pennsylvania System should have a direct route from Sunbury into the port of New York, without having to move such traffic into New York through Harrisburg and over the crowded Philadelphia and New York Divisions. As has already been stated, the Lehigh Valley would furnish a direct line. Not merely the justice of this contention, but its necessity should be conceded when it is noted that the other systems have been allocated lines in the same general territory designed to enable them to more expeditiously and directly move traffic to the port of New York.

"It will be further noted that the other systems whose lines reach the Buffalo district have a through line allocated to them either on the north or south side of the great lakes, and some have dual lines. The Pennsylvania regards it as equally indispensable to its present and future public transportation service and to save large capital outlay to have allocated to it trackage rights from Buffalo to Toledo along the south side of Lake Erie instead of using the circuitous zig-zag routes now owned and used by it for that purpose, so that it can by such trackage economically and efficiently serve these lake ports, which are now tied into its system, or else it will find it essential to construct new lake lines in the future to directly connect these various ports. I have given some illustrations of the disadvantages of the suggested allocations and the evidence of the bad results that might follow the suggested four system plan in its present shape. Other important railroads may be similarly affected and should be heard from.

"The commission itself in deal ng with the eastern systems had as many as nine systems, including the New England lines. The plan now presented would dispense with all but four systems omitting the allocation of the New England lines, and with due consideration for their own interests the three systems have divided among themselves all but a few relatively minor lines in the control of which they are willing the Pennsylvania System should participate. Summarizing the situation I would say that no consolidation plan for the Eastern district railroads can be considered as successful which does not, at the outset, face the task of solving the New England situation, and the plan submitted does not attempt to deal with this.

Presents Alternative Suggestions

"The Reading-Jersey Central System and other roads, in the nature of terminal roads, should not be allocated to any single system but should continue to be independently operated. If such disposition of the Reading-Jersey Central System should not be approved by the commission, then its allocation to the Baltimore & Ohio System would seem to be the most natural disposition of that system.

"The three systems presenting the plan have evidently expected that the allocations they have made would leave traffic relations and earnings as at present. I entirely dissent from that view, as my experience satisfies me that as the result of consolidation the traffic becomes tied as far as possible to the owning or controling system, otherwise the ownership or control is of little value. So far as the Pennsylvania System is concerned, and so far as we can see its necessities, if such a four-system plan is deemed the proper and final consolidation solution for the eastern railroads, it should have assigned to it in addition to the roads already allocated to it under the four-system plan, and for the reasons stated, the Lehigh Valley or the Lackawanna to directly reach Buffalo and the lines concentrating in the Sunbury-Susquehanna District of Eastern Pennsylvania and hold the anthracite coal tonnage it has heretofore received from the roads in that territory; the preservation of the long established traffic exchanges through the open gateway and neutral terminal road called the Reading-Jersey Central System; the Lehigh & New England as an additional route to the New England roads; the Buffalo & Susquehanna to hold its present traffic and use it for second track; a one-half interest in the Virginian for the Norfolk & Western, and thus avoid unnecessary capital expenditure for additional tracks and facilities; trackage rights along the south shore of the great lakes from Buffalo to Toledo directly connecting the various cities along the lakes which are now indirectly reached by the Pennsylvania Railroad; the assignment with the Grand Trunk, Western Lines of its one-half interest in the Detroit Terminal and the Detroit & Toledo Shore Line; and that the Chicago & Eastern Illinois be allocated in lieu of the eastern section of the Chicago & Alton as suggested."

Michigan Central Locomotive No. 8336 Equipped with Temporary Protection Back of the Coal Pit on the Tender for the Benefit of Observers of Automatic Train Control Tests

Efficiency in Heavy Freight Car Repairs*

Economic Problems and Traffic Demands Important Factors in Maintenance Program

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EFFICIENCY AS APPLIED TO HEAVY REPAIRS in freight train car maintenance implies not only the ability to recondition cars with the least expenditure for labor and material, and within the shortest period of time, but it is gaged also by the measure in which cars are produced with the least interruption from service and the promptness with which they can be offered at the point of loading, after being repaired. To accomplish an economical performance in this respect requires a carefully arranged organization and system for handing the physical features of the program and an intimate knowledge of the financial problems involved and the transportation requirements as well.

The most essential thing is a definite policy as to the manner of overcoming wear and obsolescence. If it is considered paramount to build up a large surplus of equipment within a short season of comparatively dull traffic in order to meet a maximum seasonal loading, then it becomes necessary to carry a heavy investment burden to get a large production within a short period of time, whereas, the same total production could be obtained with a much smaller investment and at a lower unit cost were it possible to maintain a uniformly consistent operation throughout the year. If this policy is essential or if the traffic requirements make the adoption of such a policy imperative it may be more economical to fall back on the contract shop rather than carry the heavy investment in the facilities necessary to get the output.

A Definite Cycle of Freight Car Repairs

It is a fairly recognized fact that there is a definite cycle for freight train car repairs and it has been determined that the average freight car requires a heavy repair or general overhauling after a period of sevice of approximately eight years. Necessity for heavy work in a shorter period than this is a fair indication of inherent weakness while an undue extension of the period will lead to a serious problem of deferred maintenance. On this basis a carrier with an ownership of 100,000 cars should prepare for an annual output of general repairs to 12,500 cars; however, this number should be modified to a certain extent by a reasonable policy of acquisition, offset by a like number which, due to physical condition and age, should be selected to be run until worn out.

In order to maintain a normal situation as to design, construction, repairs and obsolescence the average age of equipment should be thoroughly understood at all times, as this reflects whether or not old equipment is being retired when due and being replaced with new or rebuilt cars. Applying experience factors of the past, which indicate an average life of twenty years for freight cars, to the assumed ownership of 100,000 cars, it will be noted that there should be retired annually something like 5,000 cars with a like number rebuilt or purchased new. This, then, would leave 7,500 cars to be handled as heavy repairs in a regular program of routine work.

It is to be understood that the normal run of light repairs accumulating from current wear and breakage, such as is handled day by day over the rip tracks, is not to be considered in this portion of the discussion. The class of work in question is that which deals with cars in groups or series where general repairs are necessary to overcome obsolescence or weakness of design or a general overhauling due to a long period of service.

Obsolescence as applied to freight car maintenance signifies that the equipment in whole or in part is out of date or is not equal to modern usage or up to present day standards of design. The car itself may be just as good as the day it was built and yet be obsolete and not safe for handling in long trains behind the large locomotives of today. Wooden underframes, light draft gears, insufficient body bracing and similar items are factors of obsolescence and it is these features that must be overcome in the program of heavy repairs under consideration.

Old Cars Are Kept in Operation

There is a tendency of late years to extend the useful life of cars beyond the former average of twenty years. This is the result of two factors viz:—increased cost per unit and restricted finances. Two policies in this respect are to be found. A carrier with a favorable margin between expenses and revenue more likely will overcome the problem of repair turnover by acquiring new equipment, relieving the bad order situation by retirements which can readily be absorbed in operating expenses, whereas, with a carrier less favorably situated in a financial way it becomes necessary to recondition cars and extend their useful life because the road is not in a position to assume the heavy burden in operating expenses incidental to an extensive program for retirements. Under the latter policy cars are rebuilt usually at an age somewhere near the eighteenth year and when reconditioned they will have their useful life extended to about thirty years.

Body and Underframe Condition the Determining Factor

The physical feature which determines the necessity for retirement or rebuilding is the condition of the body and underframe. The wheels, trucks, and draft gear are affected by current wear and are usually repaired or renewed as occasion demands. The plan of rebuilding is somewhat favorable under present prices because of the low investment value of the old parts re-used permitting old equipment to be reconditioned to a point equivalent to new equipment at a considerably lower capital investment than would be required for an equal number of new cars. This condition, in itself, is a large factor tending toward an increase in the average life of cars. This condition, however, may change

*A paper presented at the convention of the Chief Interchange Car Inspectors' and Car Foremen's Association held at Chicago, September 23, 24 and 25, 1924.

within the course of years to the contrary, as the effect of present day prices on future rebuilding programs may result in the usable parts representing too large an investment for profitable use. This then would be favorable to the retirement of old equipment and the purchase of new cars even though the charge for the retirement of cars might be some what high.

The heavy charge to operating expense at time of retirement is due to the low rate at which depreciation is written off currently. On all carriers a certain amount is set aside each month as a sinking fund reserved for accrued depreciation, however, as the Interstate Commerce Commission does not prescribe any specific rate for depreciation, it is optional with the carrier and usually results in a rate being selected somewhat in proportion to the margin between revenues and expenses, so, generally speaking, carriers enjoying a good profit will accrue currently a sufficient reserve to reduce the final charge at time of actual retirement to an insignificant amount, while carriers less favored cannot afford to do so and must prolong the life of their cars in order to offset a lower rate of depreciation.

Take for example a series of cars twenty years old which are not fit for service in their present physical condition. Let it be assumed that they cost when new $750.00 per car. and that five years ago an addition and betterment in the way of a later type draft arm or some other feature had been applied at an increased capital value of $50.00 per car. The car, therefore, represents $800.00 in capital investment. Suppose it is decided to retire the cars and dismantle them. Assuming in this case that 1½ per cent is the rate of current depreciation per annum, the current depreciation on the original investment for 20 years is deducted therefrom as is also that for the addition and betterment for five years and the amount remaining represents that portion of the capital which must be written off. Certain parts of the cars being usable for repairs to other equipment may be taken into store stock at an appraised value and in addition there will be some scrap credit to the investment. The value of these is also deducted from the investment after which the amount remaining in capital account must be charged to operating expense, that is, maintenance of equipment, in order to clear the investment accounts. There would also be an additional charge to cover the labor cost of dismantling, which is charged to retirements but does not affect the writing off of the investment. This example set up in actual figures would work out as follows:

Original investment	$750.00	
Additions and betterments	50.00	$800.00
Depreciation:		
1½ per cent on $750 for 20 years	$225.00	
1½ per cent on $50 for 5 years	3.75	228.75
Present ledger value		$571.25
Salvage credits:		
Parts usable	$130.00	
Scrap	21.25	151.25
Investment charge remaining		$420.00
Cost to dismantle		30.00
Total charge to M. of E. account per car		$450.00

From this it will be seen that if for the sum of say $300.00 per car some of which may be chargeable to additions and betterment the equipment can be reconditioned for 10 years additional service, the saving in operating expenses is quite appreciable while at the end of the 10 years the current depreciation would have reduced the final retirement charge to a point less burdensome.

On the other hand had the current rate of depreciation been higher the margin would not have been sufficint to have warranted the cost of repairs in which case it would be better to charge the balance to maintenance and buy new equipment which would require but little expense for a number of years. Such a case using depreciation at four per cent would work out as follows:

Original investment	$750.00	
Additions and betterments	50.00	$800.00
Depreciation:		
4 per cent on $750 for 20 years	$600.00	
4 per cent on $50 for 5 years	10.00	610.00
Present ledger value		$190.00
Salvage credits:		
Parts usable	$130.00	
Scrap	21.25	151.25
Investment charge remaining		$38.75
Cost to dismantle		30.00
Total charge to M. of E. account per car		$68.75

In this case it will be noted that the total cost to retire is much less than it would cost to repair the cars. Under this latter circumstance it is possible to confine judgment of the retirement of cars on the basis of physical condition alone, as should be the case.

New Equipment Affects Maintenance Problem

The policy as to acquisition of new equipment is another factor in freight car maintenance. With the exception of carriers where one commodity is handled almost exclusively, there will be a large diversity in the class of cars owned and it is not practical from many standpoints to purchase the theoretical number of each class each year. It usually happens that large numbers of a certain class are purchased at one time making up the deficit in that particular class for several years past and probably for the future. This is a correct policy and if consistently followed will result in a proper balance, and the degree of standardization accomplished will have favorabe effect upor. expenses by reducing the stock of material in number of parts and the investment necessary. However, it has usually happened in the past due to conditions of traffic or finances that there has been no regularity in the purchase of new equipment. A survey of the age of the cars owned will undoubtedly show a large number purchased within a year or two with wide gaps intervening wherein few, if any, acquisitions were made. This leads to a serious maintenance problem as large numbers will fall due for heavy repairs at approximately the same time.

Contract Repair Shops May Help Carry Peak Load

A carrier confronted with a condition of this kind where it becomes necessary to recondition a large number of cars within a short period of time should review the situation carefully before deciding on the measures to be taken. It may be found after a survey of the equipment owned that it is merey a temporary condition which could be overcome by handing a portion of the work over to contract shops, whereas, if facilities were built up to combat with the peak condition, there might be a period of several years when the facilities would lie practically ide while the road would be carrying a large burden of investment charges without return on the capital invested. Therefore, it would seem more economical to provide facilities of sufficient capacity for the normal run of repair work with a consistent margin to take care of seasonal peaks and other contingencies depending on outside sources for assitance in case of heavy accumulations as mentioned above.

It would, therefore, seem that for the ownership of 100,000 cars assumed for this discussion an annual output of say 10,000 cars should be a reasonable provision of facilities. The maximum output, of course, is contingent upon the policy pursued as to seasonal peaks. If a uniform force can be maintained throughout the year this would result in a daily output of about 35 cars while on the other hand if 75 per cent of the work must be done during six months of the year then there should be an output of something like 50

cars per day. There may be other combinations such as facilities on one portion of the system working on coal cars during the summer season, in another section it may be imperative to work on ore cars during the winter months, and in another grain cars during the late winter and early summer, so that the particular shop or yard must be capable of meeting the particular service requirement.

Another factor to be considered is the policy pursued with respect to current repairs on the rip tracks over a system. Carefully laid plans as to systematic repairs and standardization of parts will prove a big factor in the way of getting a full term of service from cars and will assist greatly in maintaining a consistent operation and program for general repairs.

Organization, System and Arrangement of Facilities

With a definite policy established with respect to the features previously discussed the problem of handling the actual physical work is greatly simplified. This is principally a matter of organization, system and arrangement of facilities. Heavy repair points should be located advantageously as to supply of material, traffic demand for cars being repaired, climatic conditions and labor markets. Enclosed repair tracks are desirable but are not essential to economical operation except under unfavorable weather conditions. The degree of necessity is more pronounced in steel car work than for handling wooden cars, mainly on account of the need for overhead crane facilities. However, it may be said with assurance that the possibilities for economy in shop operation are greater where the work is done under roof, but it should be remembered that the enclosed shop represents a large investment for which the carrying charges must be offset before any savings can be claimed.

In the committee work of both the American Railway Association and the American Railway Engineering Association which has been quite active since Federal control it has been found impractical to attempt to establish a general layout for shop operation that coud be used even as a guide and that the best assistance can be given by way of stating a few general principles. It is quite generally agreed that freight car repair shops should have longitudinal tracks and be arranged for cars to feed in at one end and out at the other. Ample supply trucks and paved roadways should be provided for delivery of supplies and materials even where overhead cranes are provided as the motor truck and trailer, or tram car are more adapted to this work than the overhead crane which is more useful for and would be occupied with the handling of heavy parts. It is also generally agreed that it is quite profitable to install overhead cranes of 15 to 20 ton capacity as the additional expense is not unreasonably large where the investment has been undertaken to house the repair tracks and facilities. The system of moving cars along by progressive steps as the work proceeds is coming more and more into general use and is proving economical and successful because of the simplicity of material delivery and the ability to specialize in gang work. The degree of success from this method depends greatly upon the ability to run cars through in sufficiently large groups of the same series to allow for specialization and uninterrupted progression.

After all possible has been said on the subject the key to the whole situation can be summarized into three words: policy, organization and facilities, for without a plan embracing each of these full efficiency in car repair programs cannot be realized.

THE PROPOSED EXTENSION of the Canadian National northward into the Peace River Country, which has been under discussion between the railway and other governmental officers, was to have been the subject of a conference, in December, looking to the selection of a route; but this conference has been postponed until after the first of January.

More Ties Treated in 1923

ACCORDING TO STATISTICS issued by the Forest Service of the United States Department of Agriculture, in co-operation with the American Wood Preservers' Association, 53,610,175 crossties were treated in 1923, or 12,293,701 more than in 1922. Although the total for 1923 is 1,773,340 ties less than the total for 1921, which was the record output for treated ties, the total quantity of timber of all kinds subjected to preservative treatment during the past year is the greatest on record. Expressed in cubic feet of timber this total was 224,375,468, as compared with 166,620,347 for 1922, and 201,643,228 for 1921, the largest previous maximum. The record total for all classes of timbers in spite of the fact that the treatment of ties was not as large as in 1921, is accounted for by a marked increase in the treatment of piles, poles, crossarms and construction timbers. In all of these classes the quantity treated in 1923 exceeded all previous records. While the total for wood blocks and miscellaneous materials are larger than for 1922, the record for 1923 had been exceeded previously.

WOOD PRESERVATION 1909-1923, TOGETHER WITH CONSUMPTION OF CREOSOTE AND ZINC CHLORIDE

Year—	Total material treated, cubic feet	Number of cross ties treated	Creosted used, gallons	Zinc chloride used, pounds
1909	75,946,419	20,693,012	51,426,212	16,215,107
1910	100,074,144	26,155,677	63,266,271	16,802,532
1911	111,524,563	28,394,140	73,027,335	16,359,797
1912	125,931,056	32,394 336	83,666,490	20,751,711
1913	153,613,888	40,260,416	103,378,359	26,466,803
1914	159,582,639	43.846,987	79,334,606	27,212,259
1915	140,858 963	37,085,585	80,859,442	33,269,604
1916	150,522,982	37,469,368	90,404,749	26,746,527
1917	137,338,586	33 459,4 0	75.541,737	26,444,689
1918	122,612,890	30,609 209	52,776,386	31,101,111
1919	146,060,994	37,567,927	65,556,247	43,483,134
1920	173,309,505	44,987,532	68,757,508	49,717,929
1921	201,643 228	55,383,515	76,513,279	51,375,360
1922	166,620,347	41,316,474	86,321,389	29,868,639
1923	224,375,468	53,610,175	127,417,305	28,830,817

CUBIC FEET OF TIMBER OF VARIOUS CLASSES TREATED IN 1922-1923

Classes—	1922	1923
Crossties	123,949,422	160,830,525
Piles	7,496,789	9,569,443
Poles	17,008,640	26,886,904
Wood blocks	3,947,551	4,932,307
Cross arms	374,829	420,206
Construction timber	12,713,080	18,837,795
Miscellaneous lumber	1,130,036	2,898,288
Total material treated	166,620,347	224,375,468

With a record output for treated timber it follows that the record in the consumption of treating materials exceeded previous totals. The quantities of preservatives used during the year were as follows: 127,417,305 gal. of creosote, 1,507,932 gal. of paving oil, 28,830,817 lb. of dry zinc chloride and 4,706,968 gal. of miscellaneous preservatives. Of particular interest in this connection is the marked increase in the use of creosote, which exceeded the consumption for 1922 by 41,095,916 gal., or 48 per cent. The statistics show an increase in the use of all preservatives except zinc chloride, of which the volume used was 1,037,822 lb. less than in 1922, and but little more than half of the quantity used in 1921.

Referring specifically to the treatment of railway crossties, the statistics show that of the total number of crossties treated, 34,722,570 were impregnated with creosote, 15,379,335 with zinc chloride, 3,502,391 with the zinc-creosote emulsion and only 5,879 with any other preservatives. The degree of impregnation with creosote ranged from 3.67 to 12 lb. of oil per cu. ft. With zinc chloride the treatment ranged from 0.4 to 0.515 lb. per cu. ft. With the zinc creosote emulsion the treatment ranged from 0.457 to 0.510 lb. of salt and from 1.0 to 2.04 lb. of creosote. Of the ties treated in 1923 the largest quantity comprised oak ties, of which 16,899,670 were treated. The quantity of yellow pine almost equalled this, with a total of 16,842,251. Douglas fir was third with a total of 5,953,143.

General News Department

The Southern Pacific has reduced the running time of the Sunset Limited between New Orleans, La., and San Francisco, Cal., one hour, 15 minutes and the Sunset Express one hour 35 minutes. Under the new schedule the Sunset Limited will leave San Francisco, Cal., at 6:15 p. m. Two cars on each train will have bathrooms and the train will have a barber shop, valet service and ladies' maids.

The Supreme Court of the District of Columbia has dismissed the application of the Kansas City Southern for a writ of mandamus to require the Interstate Commerce Commission, in its valuation work, to ascertain and report the value in exchange, to give a more detailed analysis of its methods, and in other respects modify the plan it has followed in making its valuation reports. Attorneys for the road immediately prepared for an appeal to a higher court.

The Supreme Court of the United States on October 27 again refused to review the case of former employees of the Atchison, Topeka & Santa Fe who were convicted of criminal conspiracy to obstruct the mails and interfere with interstate commerce after having suddenly gone on strike at Needles, Calif., at the time of the shopmen's strike in 1922, leaving passengers stranded in extremely hot weather. On October 13 the court had declined to review the case but an application was filed for a reconsideration.

H. E. Byram Knighted by Japan

H. E. Byram, president of the Chicago, Milwaukee & St. Paul, was decorated on October 27 with the Order of the Rising Sun by the Japanese government in recognition of courtesies extended to visiting railroad engineers from Japan and for suggestions given them as to the electrification of the Imperial Japanese Government Railways. The Order is the highest decoration in the power of the Japanese government to confer and is seldom awarded to Americans.

Campaign Fund Committee Criticizes Pennsylvania Dining Car Menu

W. W. Atterbury, vice-president of the Pennsylvania, was questioned on October 24 by the Senate campaign fund investigating committee regarding the practice of the road in publishing on the back of its dining car bills of fare arguments, including quotations from the *Railway Age* and other publications, in opposition to the government ownership ideas of Senator La Follette. General Atterbury took the position that the road was entirely justified in using this method of discussing public questions affecting the railroads; while Senator Caraway and Samuel Untermyer and Frank P. Walsh, counsel for La Follette, in their questions took the position that the company had no right to use money taken from rates paid by the public, for campaign purposes.

Work on Toronto Viaduct Likely to Start Soon

An important conference of railway heads was held last week in the office of George P. Graham, Acting Prime Minister of Canada and also Minister of Railways and Canals, to iron out some difficulties in connection with the construction of the $30,000,000 Toronto viaduct. Those present at the meeting in Ottawa, in addition to the minister, were: Sir Henry Thornton, president of the Canadian National; S. J. Hungerford, vice-president in charge of operation of the Canadian National; E. W. Beatty, president of the Canadian Pacific; Grant Hall, vice-president of that road; Graham A. Bell, Deputy Minister of Railways and Canals; and Col. A. E. Dubuc, chief engineer of the department. Near the close of the last session of the Canadian Parliament a measure was introduced by Mr. Graham and passed by both houses providing the legal and financial machinery for the construction of the Toronto viaduct. Just previous to that legislation Col. Dubuc, the department's chief engineer, submitted to the interested parties his plan for the viaduct. The legislation gave those parties four months from its passage on July 16 to agree upon the plans and commence work. As over three of those months had passed without a complete agreement as to procedure and some engineering details the minister called the roads together to urge them to speed up their engineering departments. A genuine desire to get together at once on matters of engineering details was manifested at the conference by the railways, and the same evening the engineers of the two roads proceeded to Toronto to get down to business.

Canadian Supreme Court—Not Government—Must Rule on Crow's Nest Rates

Western Canada continues to be deeply agitated by the decision of the Dominion Railway Board a few days ago on the Crow's Nest Pass freight rates case, and the three Prairie provinces, through their attorney, H. J. Symington of Winnipeg, has formally appealed to the federal Cabinet to suspend the Board's order pending an appeal, so that the West will not be subjected to the higher rates until the case has been finally disposed of. It was announced by the Railway Board that the rates would revert to the level as of before July 7 last on October 27. Nothing has been done by the Cabinet to prevent that reversion.

George P. Graham, Acting Premier, announced that nothing would be done by the Cabinet until a full meeting of that body was possible, and that will not be before November 10 when Premier King and six of his Cabinet colleagues return from a tour of Western Canada. It is highly probable that the Cabinet will inform Western Canada that any appeal from the Railway Board's order would have to be heard by the Supreme Court of Canada, as it is a question of law and not of fact on which the appeal is based.

Premier King, speaking in Vancouver last week, said he was prevented from making any specific statement on the freight rates situation as the question was now before the courts. "On the general question, however," said the Premier, "I can say that I cannot, as a Liberal, conceive of any policy other than a policy of equality for all parts of the Dominion, and I would be betraying the Liberalism for which I stand if I envisaged any other policy," the Premier declared.

He added that there might be factors of the determining of equality that were not now generally apparent, but he had no doubt that an understanding on these factors could be brought about to the satisfaction of all concerned in all parts of Canada.

Declaring his belief that some such expert body as the Railway Commission must continue as the right and proper method to determine the rate structure, Premier King added that "Parliament must not abandon its right to lay down general principles, and Parliament will say to the commission that it must take the broadest view of all rate questions in the interests of all concerned."

1923 Year of Heaviest Traffic in Canada

Freight traffic during 1923 was the heaviest ever handled by the Canadian railways, according to official statistics just issued. It amounted to 102,258,933 tons of revenue freight and 34,067,658,527 revenue ton-miles, making the average distance each ton was carried 333 miles. The previous high record was in 1920 with 31,894,411,479 revenue ton-miles. Passenger traffic was 9 per cent heavier than in 1922, but was still below the 1919 and 1920 records.

The bumper crops of 1922 and 1923 greatly increased the grain traffic of the railways, although there was a considerable drop in the volume of United States corn handled. This was short-haul service and was more than offset by the big increase in the

long-haul Western wheat and other grains. The uninterrupted operation of the coal mines throughout the year, the revival of the iron industry and of the mining industry caused an exceptionally heavy movement of mine products, increasing the tonnage over that of 1922 by over 9,000,000 tons; coal accounted for two-thirds of this increase. Manufactures and miscellaneous showed as a group an increase of 3,000,000 tons.

Reduction in grain rates on July 6, 1922, and on rates on basic commodities on August 1, 1922, affected the revenues throughout the entire year of 1923, so that the increased traffic, as compared with that of 1922, did not produce a corresponding increase in revenues. The only general change in rates in 1923 were equalizations of rates in the Maritime provinces and on October 22 a reduction of 10 per cent on grain and grain products to Vancouver for export.

While freight traffic was heavier than in 1922 by 12 per cent the lower rates and other factors, such as a larger proportion of the traffic being low class freight, affected the freight revenue, reducing the increase to $20,690,410 or 6.5 per cent. Passenger revenues showed an increase over 1922 of $5,728,696, and total revenues were larger by $37,650,919 or 8.5 per cent. Operating expenses, however, were heavier by $19,935,412 or 5 per cent, making the increase in net operating revenue $17,715,507, and reducing the operating ratio from 89.4 per cent to 86.5 per cent. Maintenance of way and structures expenses were increased by $3,613,499, and transportation expenses by $14,340,335 or 7.6 per cent, but maintenance of equipment expenses, the lowest since 1919, were reduced by $1,559,232.

Freight trains were loaded heavier on an average than for any previous year. Larger locomotives and heavier loading of cars increased the load to 502 tons of revenue freight as against 481 tons in 1922 and 457 tons in 1920. There was an increase of 321 miles of track operated at the close of the year. Railway construction during the year was active, especially in the Western provinces. In Saskatchewan 537 miles were under contract; in Alberta, 387 miles; in British Columbia, 239 miles; and for the whole Dominion 1,226 miles, while an additional 1,012 miles has been surveyed but no construction work done.

Bridge and Building Supply Men's Exhibit

A total of 47 firms were represented in the exhibit of bridge, building and water service equipment and materials at the convention of the American Railway Bridge and Building Association at Kansas City on October 21-23, the report of which was presented in the *Railway Age* of October 25. The officers of this association during the past year were: President, G. R. McVay, The Barrett Company, Chicago; vice-president, A. J. Filkins, Paul Dickinson Company, Chicago; secretary, John Nelson, Joseph E. Nelson & Sons, Chicago; treasurer, D. J. Higgins, American Valve & Meter Company, Chicago. Directors: T. W. Snow, T. W. Snow Construction Company, Chicago; F. M. Condit, Fairbanks-Morse & Co., Chicago; C. H. Hunsaker, Massey Concrete Products Corporation, St. Louis, Mo.; H. C. Brown, Chicago Bridge & Iron Works, New York City.

The firms which were represented, together with the materials and devices shown and the names of their representatives, follows:

American Tar Products Co., Chicago, S. H. Fields.

American Valve & Meter Co., Cincinnati, Ohio; model of drop spout and water column; J. T. McGarry and D. J. Higgins.

American Hoist & Derrick Co., St. Paul, Minn., literature; D. L. O'Brien.

Barber Asphalt Co., Philadelphia, Pa., literature and samples of roofing waterproofing, mastics, paint, etc.; W. P. Newhall and J. F. Dean.

Barrett Co., New York, roofing, shingles, creosote oil, preservative paint, specifications and literature; G. R. McVay and F. S. Nichols.

The Buda Co., Chicago, literature, motor cars, jacks and tool grinders; Geo. W. Hoover and A. L. Bliss.

Carter Bloxonend Flooring Co., Kansas City, Mo., built up wood block flooring; L. A. Gunether and J. G. Galvin.

Chicago Bridge & Iron Works, Chicago, photographs and literature; E. P. Shelton.

Cook, Inc., A. D., Lawrenceburg, Ind., deep well equipment; F. R. Giles.

Detroit Graphite Co., Detroit, Mich., samples of paint and literature; Tom R. Wyles, L. F. Flanagan and W. D. Waugh.

Detroit Steel Products Co., Detroit, Mich., photographs and samples of steel sash; R. S. Bishop and J. L. Bliss.

Duff Mfg. Co., Pittsburgh, Pa., jacks; G. E. Anderson.

Fairbanks-Morse Co., Chicago, literature; C. H. Wilson, F. M. Condit, B. S. Spaulding, E. C. Golladay, H. L. Hillerary, A. J. Olson.

Highgrade Mfg. Co., Cleveland, Ohio, literature and samples of roofing cement; S. A. Baber.

Home Lumber Co., New Orleans, La.; W. W. Bradley.

Johns-Manville, Inc., New York, samples of roofing, pipe and boiler insulations, packing, shingles, corrugated siding and roofing waterproofing and industrial flooring; P. C. Jacobs and W. H. Lawrence.

Joseph Dixon Crucible Co., Jersey City, N. J., literature.

The Kinnear Mfg. Co., Columbus, Ohio; H. F. Wehrle.

Kansas City Bridge Co., Kansas City, Mo., photographs; W. D. Glasscock.

Kansas City Structural Steel Co., Kansas City, Mo.

Lehon Co., The, Chicago, samples of roofing and shingles, waterproofing and roof coatings; Tom Lehon, John E. Eipper and J. W. Shoop.

Long & Sons, E. M., Cadiz, Ohio, model O. G. for gutters; A. C. Long and J. C. Kinny.

Long-Bell Lumber Co., Kansas City, Mo.

Luittwieler Pumping Engine Co., Rochester, N. Y., model of pumping engine; O. G. Smith.

Massey Concrete Products Corporation, Chicago, literature; C. H. Hunsaker, D. A. Hultgren and Paul Kircher.

Missouri Valley Bridge & Iron Works, Leavenworth, Kas.

Murdock Manufacturing & Supply Co., Cincinnati, Ohio, hydrants, railway water service box and drinking fountains; J. C. Endebrock.

National Lead Co., New York, literature; Chas. L. Haas, A. H. Sabin, W. S. Carlisle, F. E. Dodge, F. M. Hartley, Jr., and W. Grant.

Nelson & Sons, Jos. E., Chicago, literature; John Nelson and I. B. Tanner.

New Jersey Zinc Sales Co., New York, down spouts and gutters; D. P. Brannin.

Patterson & Co., W. W., Pittsburgh, Pa., tackle blocks; W. W. Patterson, Jr.

Patterson-Sargent Co., Cleveland, Ohio, literature; G. W. Anderson and H. H. Kohrs.

Paul Dickinson Co., Chicago, models of cast-iron camp car jack, ventilators and chimneys for small buildings; A. J. Filkins and C. W. Hansen.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., plate glass, brushes and literature; B. E. Foster.

Portland Cement Association, Chicago, literature and balopticon; L. M. Arms and H. C. Boyden.

Railway Age, New York; copies of *Railway Age*, Railway Engineering and Maintenance and Maintenance of Way Cyclopedia; E. T. Howson, W. S. Lacher, F. C. Koch and J. M. Rutherford.

Railway Equipment and Publishing Co., New York, literature; B. J. Wilson.

Railway Review, Chicago, copies of paper; Geo. E. Boyd.

Redwood Manufacturing Co., San Francisco, Cal., B. F. Wade.

Robertson & Co., Wm., Chicago, model of culvert; R. F. Repasz and W. K. Robertson.

Ruberoid Co.

Sherwin-Williams Co., Cleveland, Ohio, literature and samples of paint; F. G. Sittington and O. D. Lightner.

Snow Construction Co., T. W., Chicago, literature; O. T. Snow.

Toch Brothers, Inc., New York; Dwight E. Robinson.

U. S. Wind Engine & Pump Co., Batavia, Ill., literature; C. E. Ward.

Volkhardt Co., Inc., The, New York, model of hydrants and parts; William Volkhardt.

W. J. Zitterell Co., Webster City, Iowa; Guy C. Mills.

At the annual meeting held on Thursday morning, October 23, the following officers were elected for the ensuing year: President, A. J. Filkins, Paul Dickinson Co., Chicago; vice-president, D. J. Higgins, American Valve & Meter Co., Chicago; treasurer, J. E. Nelson, Joseph E. Nelson & Sons, Chicago; secretary, B. J. Wilson, Pocket List of Railroad Officials, Chicago. Directors for term expiring in 1927: D. Hultgren, Massey Concrete Products Co., Chicago; O. T. Snow, T. W. Snow Construction Co., Chicago; W. D. Waugh, Detroit Graphite Co., St. Louis, Mo.; J. W. Shoop, The Lehon Company, Chicago. The above officers, with F. M. Condit, Fairbanks Morse & Co., Chicago, and H. C. Brown, Chicago Bridge & Iron Works, New York, directors for the two year term expiring in 1927, constitute the board of directors.

Meetings and Conventions

The following list gives names of secretaries, dates of next or regular meetings and places of meetings.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 165 Broadway, New York City. Next convention, May 5-8, 1925, Los Angeles, Calif. Exhibit by Air Brake Appliance Association.

AIR BRAKE APPLIANCE ASSOCIATION.—John Wright, Westinghouse Electric & Manufacturing Co. Meeting with Air Brake Association.

AMERICAN ASSOCIATION OF ENGINEERS.—C. E. Drayer, 63 E. Adams St., Chicago. Next convention, 1925, Orlando, Fla.

AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS.—Grant Williams, 1341 Railway Exchange, Chicago.

AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.—E. L. Duncan, 332 So. Michigan Ave., Chicago. Annual meeting, June 23, 1925, Portland, Ore.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—J. Rothchild, Room 400, Union Station, St. Louis, Mo. Next convention, June 16-19, 1925, Richmond, Va.

AMERICAN ASSOCIATION OF SUPERINTENDENTS OF DINING CARS.—L. A. Stone, C. & E. I. Ry., Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—J. W. Welsh, 8 W. 40th St., New York.

AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPE FITTERS' ASSOCIATION.—C. Borcherdt, 202 North Hamilton Ave., Chicago, Ill.

AMERICAN RAILWAY ASSOCIATION.—H. J. Forster, 30 Vesey St., New York, N. Y. Next meeting, November 19, Yale Club, Vanderbilt Avenue, New York.

Division I.—Operating.—J. C. Caviston, 30 Vesey St., New York.

Freight Station Section (including former activities of American Association of Freight Agents).—R. O. Wells, Freight Agent, Illinois Central Railroad. Chicago, Ill. Next meeting, May 19-21, 1925, Kansas City, Mo.

Medical and Surgical Section.—J. C. Caviston, 30 Vesey St., New York, N. Y.

Protective Section (including former activities of the American Railway Chief Special Agents and Chiefs of Police Association).—J. C. Caviston, 30 Vesey St., New York, N. Y.

Safety Section.—J. C. Caviston, 30 Vesey St., New York.

Telegraph and Telephone Section (including former activities of the Association of Railroad Telegraph Superintendents). W. A. Fairbanks, 30 Vesey St., New York.

Division II.—Transportation (including former activities of the Association of Transportation and Car Accounting Officers).—G. W. Covert, 431 South Dearborn St., Chicago, Ill.

Division III.—Traffic, J. Gottschalk, 143 Liberty St., New York.

Division IV.—Engineering, E. H. Fritch, 431 South Dearborn St., Chicago, Ill. Next annual meeting, March 10-12, 1925, Chicago. Exhibit by National Railway Appliances Association.

Construction and Maintenance Section.—E. H. Fritch.

Electric Section.—E. H. Fritch.

Signal Section (including former activities of the Railway Signal Association).—H. S. Balliet, 30 Vesey St., New York, N. Y.

Division V.—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill. Exhibit by Railway Supply Manufacturers' Association.

Equipment Painting Section (including former activities of the Master Car and Locomotive Painters' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill.

Division VI.—Purchases and Stores (including former activities of the Railway Storekeepers' Association).—W. J. Farrell, 30 Vesey St., New York, N. Y. Exhibit by Railway Supply Manufacturers' Association.

Division VII.—Freight Claims (including former activities of the Freight Claim Association).—Lewis Pilcher, 431 South Dearborn St., Chicago, Ill. Annual meeting, May 25, 1925, Kansas City, Mo.

Car Service Division—C. A. Buch, 17th and H Sts., N. W., Washington, D. C.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Exhibit by Bridge and Building Supply Men's Association.

AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.—A. L. Moorshead, Industrial Engineer, Erie, New York City. Next meeting, May 13, 1925, San Antonio, Texas.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—(Works in co-operation with the American Railway Association, Division IV.) E. H. Fritch, 431 South Dearborn St., Chicago. Annual meeting, March 10-12, 1925, Chicago. Exhibit by National Railway Appliances Association.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—(See American Railway Association, Division V.)

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, C. M. & St. P. Ry., 11402 Calumet Ave., Chicago. Exhibit and Supply Association of the American Railway Tool Foremen's Association.

AMERICAN SHORT LINE RAILROAD ASSOCIATION.—T. F. Whittelsey, 1319-21 F St., N. W., Washington, D. C.

AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eisenman, 4600 Prospect Ave., Cleveland, Ohio.

AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—33 W. 39th St., New York. Regular meetings 1st and 3rd Wednesdays in month, except July and August, 33 W. 39th St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Railroad Division, A. F. Stuebing, Chief Engineer, Bradford Draft Gear Co., 23 W. 43rd St., New York.

AMERICAN TRAIN DISPATCHERS' ASSOCIATION.—C. L. Darling, 1310-1311 Mallers Bldg., Chicago, Ill. Biennial convention, July 20, 1925, Chicago.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—P. R. Hicks, Room 1146, Otis Bldg., Chicago. Annual meeting, February 3-5, 1925, Congress Hotel, Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, District Claim Agent, North Pacific Ry., St. Paul, Minn. Annual meeting, June 17, 1925, Winnipeg, Canada.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sts., Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.

ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, 17th and H Sts., N. W., Washington, D. C. Next meeting, November 19, Yale Club, Vanderbilt Avenue, New York, N. Y.

ASSOCIATION OF RAILWAY SUPPLY MEN.—A. W. Clokey, 1658 McCormick Bldg., Chicago. Meeting with International Railway General Foremen's Association.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—(See American Railway Association, Division I.)

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—(See American Railway Association, Division II.)

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—John Nelson, Joseph E. Nelson & Sons, 3240 South Michigan Ave., Chicago. Meeting with convention of American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—C. R. Crook, 129 Charron St., Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 626 North Pine Ave., Chicago. Regular meetings, 2nd Monday in month, except June, July and August, Great Northern Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—R. E. Giger, 721 North 23rd St., East St. Louis, Ill. Meetings, first Tuesday in month at the American Hotel Annex. St. Louis.

CENTRAL RAILWAY CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 2nd Thursday, January to November. Interim meetings, 2nd Thursday, February, April, June, Hotel Statler, Buffalo, N. Y.

CHICAGO CLAIM CONFERENCE.—Personal Injury Section. Parks C. Archer, General Claim Agent, Chicago & Alton R. R., 340 Harrison St., Chicago. Meets 12:30 p. m., first Monday each month, City Club, 315 Plymouth Court, Chicago.

CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S ASSOCIATION.—A. S. Sternberg, Belt Ry. of Chicago, Polk and Dearborn Sts., Chicago.

CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S SUPPLY MEN'S ASSOCIATION.—Bradley S. Johnson, W. H. Miner, Rookery Bldg., Chicago, Ill. Meeting with Chief Interchange Car Inspectors' and Car Foremen's Association.

CINCINNATI RAILROAD CLUB.—W. C. Cooder, Union Central Bldg., Cincinnati, Ohio. Meetings, 2nd Tuesday in February, May, September and November.

CLEVELAND STEAM RAILWAY CLUB.—F. L. Frericks, 14416 Adler Ave., Cleveland, Ohio. Meetings, first Monday each month, Hotel Cleveland, Public Square, Cleveland.

EASTERN RAILROAD ASSOCIATION.—E. N. Bessling, 614 F St., N. W., Washington, D. C. Annual meeting, May 14, 1925, Railroad Club, New York.

FREIGHT CLAIM ASSOCIATION.—(See American Railway Association, Division VII.)

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—C. H. Treichel, Grand Central Station, Chicago. Regular meetings, Wednesdays, preceding 3rd Friday in month, Room 1414, Manhattan Bldg., Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITH'S ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich. Exhibit by International Railroad Master Blacksmiths' Supply Men's Association.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' SUPPLY MEN'S ASSOCIATION.—George P. White, 747 Railway Exchange, Chicago. Meeting with International Railroad Master Blacksmiths' Association.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—J. B. Hutchison, 6000 Michigan Ave., Chicago. Next annual convention, May, 1925, Chicago. Exhibit by International Railway Supply Men's Association.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabash Ave., Winona, Minn.

INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—F. S. Wilcoxen, Edna Brass Manufacturing Company, Cincinnati, Ohio. Meeting with International Railway Fuel Association.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 26 Cortlandt St., New York. Next convention, May 19-22, 1925, Hotel Sherman, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION.—(See A. R. A., Division V.)

MASTER CAR BUILDERS' ASSOCIATION.—(See A. R. A., Division V.)

MOBILE TRAFFIC & TRANSPORTATION CLUB.—T. C. Schley, 71 Conti St., Mobile, Ala. Regular dinner meetings, 6 p. m. on 2nd Thursday of each month, Battle House Hotel, Mobile, Ala.

NATIONAL ASSOCIATION OF RAILWAY TIE PRODUCERS.—J. S. Penney, T. J. Moss Tie Company, St. Louis, Mo. Next convention, 1925, Chicago.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.—James B. Walker, 49 Lafayette St., New York. Next convention, Nov. 11, 1924. Hotel Adams, Phoenix, Ariz. Meetings in State Capitol.

NATIONAL FOREIGN TRADE COUNCIL.—O. K. Davis, 1 Hanover Square, New York.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, People's Gas Bldg., Chicago. Annual exhibition at convention of American Railway Engineering Association.

NATIONAL SAFETY COUNCIL.—Steam Railroad Section: E. R. Cott, Safety Agent, Hocking Valley Ry., Columbus, Ohio.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2nd Tuesday in month, excepting June, July, August and September, Copley-Plaza Hotel, Boston, Mass.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 3rd Friday in month, except June, July and August, at 29 W. 39th St., New York.

PACIFIC RAILWAY CLUB.—W. S. Wellner, 64 Pine St., San Francisco, Cal. Regular meetings, 2nd Thursday in month, alternately in San Francisco and Oakland.

RAILWAY ACCOUNTING OFFICERS' ASSOCIATION.—E. R. Woodson, 1116 Woodward Building, Washington, D. C.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 600 Liberty Bldg., Broad and Chestnut St., Philadelphia, Pa. Annual meeting and dinner, in second week of December, 1924.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 515 Grandview Ave., Pittsburgh, Pa. Regular meetings, 4th Thursday in month, except June, July and August, Fort Pitt Hotel, Pittsburgh, Pa.

RAILWAY DEVELOPMENT ASSOCIATION.—(See Am. Ry. Development Assn.)

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, General Electric Co., Chicago. Annual meeting with Association of Railway Electrical Engineers.

RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—Joseph Sinkler, Pilot Packing Co., Peoples Gas Bldg., Chicago. Meeting with Traveling Engineers' Association.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R., Baltimore, Md.

RAILWAY REAL ESTATE ASSOCIATION.—R. H. Morrison, C. & O. Ry., Richmond, Va.

RAILWAY SIGNAL ASSOCIATION.—(See A. R. A., Division IV., Signal Section.)

RAILWAY STOREKEEPERS' ASSOCIATION.—(See A. R. A., Division VI.)

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A., Division I.

RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, Commercial Trust Bldg., Philadelphia, Pa.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—P. J. McAndrews, C. & N. W. Ry., Sterling, Ill. Next convention, 1925, Kansas City, Mo. Exhibit by Track Supply Association.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2nd Friday in month, except June, July and August.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, Sunbeam Electric Manufacturing Company, New York City. Meeting with American Railway Association, Signal Section.

SOUTHEASTERN CARMEN'S INTERCHANGE ASSOCIATION.—J. E. Rubley, Southern Railway Shop, Atlanta, Ga. Meets semi-annually.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, P. O. Box 1205, Atlanta, Ga. Regular meetings, 3rd Thursday in January, March, May, July, September and November, Piedmont Hotel, Atlanta.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. L. Carrier, Car. Serv. Agent, Tenn. Cent. Ry., 319 Seventh Ave., North Nashville, Tenn.

SUPPLY ASSOCIATION OF AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—H. S. White, 9 N. Jefferson St., Chicago.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Meets with Roadmasters' and Maintenance of Way Association.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East 98th St., Cleveland, Ohio. Exhibit by Railway Equipment Manufacturers' Association.

WESTERN RAILWAY CLUB.—Bruce V. Crandall, 605 North Michigan Ave., Chicago. Annual meeting, May 23, Edgewater Beach Hotel, Chicago. Regular meetings, 3rd Monday each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—Edgar S. Nethercut, 138 W. Madison St., Chicago, Ill.

Traffic News

The Interstate Commerce Commission has again postponed the effective date of its order in the assigned car case until December 15, 1924.

The Interstate Commerce Commission has postponed the hearing at Chicago before Commissioner Campbell and Examiner Keeler in the Pullman rate case from November 6 to November 23, 1924.

The Canadian Pacific in a movement of silk which arrived from Japan on September 29, broke all speed records from the Pacific Coast to Fort William, Ont. The silk was unloaded from the vessel at the rate of eight minutes to the car. From Vancouver, B. C., to Fort William, 1,474 miles, the time of the special train was 47 hours 2 minutes; from Winnipeg, Man., to Fort William, 419 miles, the time was 9 hours 20 minutes, equal to 39.1 miles an hour.

The Southern Pacific has entered into a trackage contract with the Chicago, Rock Island & Pacific under which the S. P. will run freight and passenger trains between Fort Worth, Tex., and Dallas, 34 miles over the Rock Island. Heretofore the Southern Pacific has operated trains between these two cities over the tracks of the Texas & Pacific. As a result of the new arrangement the Southern Pacific has placed sleeping cars in operation between Dallas, Tex., and Denver, Colo., in conjunction with the Fort Worth & Denver City and the Colorado & Southern.

The Interstate Commerce Commission's monthly report to the President on the condition of railway equipment shows that during September 4,905 locomotives were inspected by the Bureau of Locomotive Inspection, of which 2,128 were found defective and 285 ordered out of service. The Bureau of Safety inspected 95,125 freight cars, of which 3,668 were found defective, and 2,043 passenger cars, of which 25 were found defective. During the month 14 cases involving 51 violations of the safety appliance acts were transmitted to various United States attorneys for prosecution.

An embargo was placed on grain shipments to Duluth and Superior terminals by northwest railroads on October 27 and continued until November 1 because terminal elevator space at the head of the lake was practically exhausted and the heavy movement of grain threatened to tie up railroad equipment and seriously delay the movement of the remainder of the crop. The embargo was foreshadowed at a meeting of the Northwest Regional Advisory Board on October 1 at Aberdeen, S. Dak., when the joint terminal grain committee reported that the congestion of grain at Twin Cities and Duluth terminal markets was serious. An appeal was made to farmers and country elevators to hold shipments, and a reduction in shipments by at least 700 cars a day was urged as an absolute necessity to prevent a tie-up that would throw the market into confusion.

Rates on Salt Revised

An extensive revision of the rates on salt, together with the commodity descriptions and minimum weights, from producing points in New York, Ohio, Michigan, Kansas and Louisiana to points on and east of the Missouri river in Iowa-Missouri territory, central, trunk-line, Carolina, southeastern and Mississippi Valley territories has been ordered by the Interstate Commerce Commission in twelve decisions embraced in a report by Commissioner McManamy, to which Commissioners Aitchison and Potter dissented.

Ore Docks Nos. 3 and 4 of the Chicago & North Western at Escanaba, Mich., were destroyed by fire on October 24, with a loss estimated at $1,500,000. At the time of the fire, dock No. 3 was being razed in preparation for the construction of a new ore dock. One employee of the contracting company which was dismantling dock No. 3 was killed.

Equipment and Supplies

Locomotives

The Southern Railway is inquiring for one three-cylinder locomotive.

The Southern Pacific.—It is understood that this company contemplates buying 18, 2-10-2 type locomotives.

The Wabash, reported in the *Railway Age* of October 25 as preparing specifications for the purchase of 50 locomotives, is now inquiring for 50 Mikado type locomotives. Of this number, 5 are to be three-cylinder locomotives.

The Pennsylvania System has just placed an order at its Altoona works for the construction of 50, 8-wheel switching locomotives of an entirely new design, to be known as the Class C-1. The principal features of these locomotives will be as follows: Cylinders, 27 in. diameter by 30 in. stroke; steam pressure, 250 lb. to the square inch; driving wheel, 56 in. diameter; weight of locomotive in working order (estimated) 275,000 lb., weight of tender, loaded, 128,000 lb., tractive power, 76,000 lb.

Southern Pacific Orders New Type Locomotive

An order has been placed by the Southern Pacific with the American Locomotive Company for one new three-cylinder "Southern Pacific type" locomotive, principal dimensions and features of which are:

Number of cylinders, three.
Dimensions of cylinders—outside cylinders 25 inches by 32 inches, middle cylinder 25 inches by 28 inches.
Number of engine truck wheels, four.
Number of pairs of drivers, five.
Number of trailing wheels, two.
Outside diameter of driving tires, 63½ inches.
Boiler pressure, 225 lb.
Weight on drivers, 310,000 lb.
Total weight, 438,000 lb.
Capacity of tender—water, 12,000 gal.
Capacity of tender—oil, 4,000 gal.

This will be the largest and most powerful unarticulated locomotive of any in use today in any country.

Freight Cars

Mobile & Ohio.—See Southern Railway.

The Michigan Central.—See New York Central.

The Northern Pacific is expected to ask for bids on 800 gondola cars.

The Great Northern is expected to accept bids on 5,000 stock car bodies.

The Southern Railway is asking for bids on 1,000 car sets of steel center sills, for freight cars.

The Missouri Pacific has given a contract to the American Car & Foundry Company, for making repairs to 300 composite gondola cars.

The New York Central has given a contract to the Illinois Car & Manufacturing Company for the conversion of 200 cars, for the Michigan Central.

The Central of New Jersey, reported in the *Railway Age* of August 9 as inquiring for 25, 30-yd. extension side dump cars, has ordered this equipment from the Magor Car Corporation.

The Southern Railway has ordered additional cars for its lines and the Mobile & Ohio from the following builders: American Car & Foundry Company, 1,095 box cars; Kilby Car & Foundry Company, 150 hopper cars; General American Car Company, 200 gondola cars. This is in addition to the orders reported in the *Railway Age* of October 4, and October 18, for 3,650 cars and 500 cars.

Passenger Cars

THE DELAWARE, LACKAWANNA & WESTERN, reported in the *Railway Age* of October 25 as contemplating buying 30 express cars, is now inquiring for 30 steel express cars 60 ft. long.

Iron and Steel

THE ERIE has placed its orders for rails for 1925 requirements. It has allotted the tonnage to the Carnegie Steel Company, the Bethlehem Steel Corporation, the Illinois Steel Company and the Inland Steel Company.

THE BALTIMORE & OHIO has ordered 200 tons of steel for two bridges from the American Bridge Company. The company has received bids for 200 tons of steel for a bridge in Maryland and it has also received bids on 600 tons for grade elimination work in Staten Island.

THE PENNSYLVANIA RAILROAD has ordered 200 tons of steel for a bridge at Monmouth Junction, N. J., from the Bethlehem Steel Corporation. A contract has been given to the McClintic-Marshall Company for 300 tons of steel for a freight terminal at Greenville, N. J.

Machinery and Tools

THE GRIFFIN WHEEL COMPANY has placed an order for a 48-in. car wheel borer.

THE CHICAGO, BURLINGTON & QUINCY has placed an order for a 48-in. car wheel borer.

THE LEHIGH & NEW ENGLAND has placed orders for the following machine tools: One Ohio heavy duty shaper, from the Machine Tools Company; one Gray maximum service planer, from the Swind Machinery Company; one 3A Universal hollow hexagon turret lathe, from the Warner & Swasey Co.; one 16-in. by 6-ft. lathe and one 20-in. by 10-ft. lathe, from the W. E. Shipley Machinery Company, and one 28-in. upright drill press, from Frank Toomey, Inc.

Miscellaneous

THE GREAT NORTHERN is inquiring for one all steel air operated spreader to be equipped on both sides with composite wings to fit the railroad's road bed cross section, to spread not less than 22 ft. from center of track.

THE NEW YORK CENTRAL has given a contract for the construction of a double-deck, screw-propelled, steel ferryboat, to the Staten Island Shipbuilding Company, at a cost of $448,800, including a W. & A. Fletcher Company engine.

THE SIAM STATE RAILWAYS will receive bids until January 15, 1925, for the supply of 260 pairs of carriage and wagon buffers with side chains. Bids should be submitted to Mom Chow Chalart, acting commissioner general of Siam State Railways, Bangkok, Siam. Specifications and drawings may be obtained from C. P. Sandberg, 100 Broadway, New York.

Signaling

THE RUTLAND RAILROAD has ordered from the Hall Switch & Signal Company, 3 color-light signals and other apparatus for installation at Rutland, Vt.

THE CANADIAN NATIONAL has ordered from the Hall Switch & Signal Company, 8 color-light signals and other material for installation at St. Augustine, Quebec.

THE NEW YORK CENTRAL has ordered from the Hall Switch & Signal Company, for installation at Katonah, N. Y., 14 color light signals, 109 relays and other apparatus.

THE KANSAS CITY SOUTHERN has ordered from the General Railway Signal Company material for automatic block signals and automatic train control on 14 miles of its line, single track, between Pittsburg, Kan., and Oskaloosa. The signals will be Model 2A semaphores, and the train control apparatus is the intermittent inductive type. Five locomotives are to be equipped with the train control apparatus.

Supply Trade News

H. T. Heath has been appointed western manager of the **Hegeman Castle Corporation,** with headquarters at Chicago.

The Superheater Company, New York, is preparing plans for the construction of a one-story power house at East Chicago, Ind.

C. F. McCuen, general sales agent of the Camel Company, Chicago, has been appointed sales representative of **W. H. Miner, Inc.,** Chicago.

C. M. Hannaford, American National Bank building, Richmond, Va., has been appointed representative in that territory for the **Locomotive Firebox Company,** Chicago, manufacturers of the Nicholson Thermic syphon.

Charles R. Speaker, Evening Star building, Washington, D. C., has been appointed representative in the District of Columbia for the **Roller-Smith Company.** Mr. Speaker will also handle the company's government business in the states of Maryland, Virginia, North Carolina and South Carolina.

Arthur Levison has been appointed chief engineer of the road building department of the **Blaw-Knox Company,** Pittsburgh, Pa. Mr. Levison has been actively connected with construction work since his graduation from New York University in 1910. He served for 4 years as assistant engineer of barge canal construction in New York state, and later as assistant engineer in subway construction work in New York city. Since July, 1919, he has been with the United States Bureau of Public Roads as highway engineer.

Obituary

Carl J. Mellin, for many years consulting engineer of the American Locomotive Company, whose death on October 15 was noted in the *Railway Age* of October 18, was born in Westergotland, Sweden, on February 17, 1851. He received his education at Alingsos and Gothenberg, Sweden. At the age of 19 he entered the Swedish State Railway shops and three years later became a draftsman with the Gothenberg Marine Engine Works. In 1877 Mr. Mellin removed to Scotland where he became connected with the Robert Napier & Sons Marine Works, remaining there until 1880 when he returned to Sweden, serving as superintendent and mechanical engineer of Thorskag & Eriksbergs Marine & Shipbuilding Co. In 1887 he came to America and served in New York City as designer for the Dynamite Gun Co., taking an active part in the development of designs for the cruiser *Vesuvius*, and later he went as mechanical engineer with the Richmond Locomotive Works. While in Richmond Mr. Mellin had charge of the design and construction of the machinery for the U. S. Battleship *Texas* and he developed the system of locomotive compound cylinders which became known as the Richmond compound and which has been used extensively on domestic and foreign railways. In 1894 he became chief engineer of the Richmond works, retaining this position until the formation of the American Locomotive Com-

C. J. Mellin

pany in 1901. In 1902 Mr. Mellin went to Schenectady as consulting engineer, which position he held until the time of his death. Among important designs promoted by Mr. Mellin were the articulated compound locomotive, the adaptation of the Walschaert valve motion to American conditions, the first successful power reverse gear and several types of superheater. Over fifty patents were assigned to him, chiefly for locomotive details. He was an active advocate of the use of three-cylinder locomotives and at the time of his last illness he was engaged in designing a three-cylinder compound engine. Mr. Mellin traveled extensively in Europe and America in the interest of naval and railway engineering and because of his service in the engineering field he was knighted and decorated by the late King Oscar of Sweden.

Trade Publications

ELECTRIC LIFT TRUCKS.—Bulletin No. 5-A, descriptive of an electric lift truck and skid system for industrial transportation, has been issued by the Cowan Truck Company, Holyoke, Mass. On pages 10 and 11 particular reference is made to the application of the Cowan truck to railway service.

FREIGHT CAR REPAIR SITUATION

1924	Number freight cars on line	Cars awaiting repairs			Per cent of cars awaiting repairs
		Heavy	Light	Total	
January 1	2,279,363	118,653	39,522	158,175	6.9
February 1	2,269,230	115,831	45,738	161,569	7.1
March 1	2,262,254	119,505	49,277	168,782	7.5
April 1	2,274,750	125,932	46,815	172,747	7.6
May 1	2,271,638	131,609	47,666	179,275	7.9
June 1	2,280,295	138,536	50,683	189,219	8.3
July 1	2,279,826	144,912	49,957	194,869	8.5
August 1	2,278,773	153,725	49,139	202,864	8.9
September 1	2,296,589	158,200	51,909	210,109	9.2
October 1	2,304,020	157,455	48,589	206,044	8.9

Month	Cars repaired		
	Heavy	Light	Total
December	87,758	2,073,280	2,161,038
January	76,704	2,083,583	2,160,287
February	70,056	2,134,781	2,204,837
March	77,365	2,213,158	2,290,523
April	75,352	2,074,629	2,149,981
May	73,646	2,130,284	2,203,930
June	70,480	1,888,899	1,959,379
July	72,347	1,567,430	1,639,777
August	71,863	1,420,482	1,492,345
September	74,295	1,372,277	1,446,572

EMPLOYEES of the Missouri-Kansas-Texas have subscribed for adjustment bonds of the company to the extent of about $750,000. The number of employees thus far participating is 1,415.

Locomotive Enginemen and Families Returning on Canadian Pacific Liner "Marburn" from European Tour Conducted by B. of L. E. Bank

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—This company plans the construction in 1925 of second main track on its line from San Diego, Calif., to Fullerton, and from San Bernardino to Riverside, a total distance of 34 miles.

ATCHISON, TOPEKA & SANTA FE.—This company has awarded a contract to Robert E. McKee, San Diego, Cal., for the construction of an addition to the boiler shop at San Bernardino, Cal. The addition will be of steel and reinforced concrete.

ATLANTIC COAST LINE.—This company has awarded a contract to Roberts & Schaefer Company, Chicago, for the construction of a 500-ton reinforced concrete four-track coaling station at Bennetts yard, Charleston, S. C.

BEAVER, MEADE & ENGLEWOOD.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension from Hooker, Okla., to Des Moines, N. M., 175 miles.

CANADIAN NATIONAL.—This company has awarded a contract to Wilson & Wilson, Regina, Sask., for the construction of a freight shed and office building at Yorkton, Sask. A contract has also been awarded to William J. Dixon, Pense, Sask., for the raising of a dam at Northgate, Sask.

CENTRAL OF GEORGIA.—This company has awarded a contract to the Roberts & Schaefer Company, Chicago, for an electric cinder plant to be installed at Columbus, Ga.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—This company has awarded a contract to the Roberts & Schaefer Company, Chicago, for an electric cinder plant to be installed at Lafayette, Ind.

CHICAGO, BURLINGTON & QUINCY.—This company, jointly with the Colorado & Southern and the city of Denver, Colo., has reached an agreement under which the channel of the Platte river will be widened to prevent floods, at an estimated cost of $100,000.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—This company has awarded a contract to the T. S. Leake Construction Company, Chicago, for the construction of a passenger station at San Pierre, Ind., reported in the *Railway Age* of October 11.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—This company has awarded a contract to a local contractor for the construction of a four-stall roundhouse and repair shop at Park Falls, Wis., reported in the *Railway Age* of October 18.

MISSOURI PACIFIC.—This company will close bids on November 1 for the construction of an addition to its tool house, 35 ft. by 55 ft., at North Little Rock, Ark. This company will close bids on October 30 for the construction of an oil station at St. Louis, Mo.

NATIONAL RAILWAYS OF MEXICO.—This company is reported contemplating the construction of a branch line from Juarez, Chihuahua, Mexico, to Ojinaga, a distance of 200 miles.

NORTHERN PACIFIC.—This company has dismantled the steel train-shed of the Union station at Duluth, Minn., and is now constructing an umbrella type shed over the six platforms of the station. New platforms of vitrified bridge construction, with concrete curbs, are also being laid. The total cost of the project, which includes extensive renovations of the station, will be approximately $100,000.

PACIFIC FRUIT EXPRESS.—This company closed bids on October 18 for the construction of refrigerator car repair shops at Nampa, Idaho, reported in the *Railway Age* of July 5.

PENNSYLVANIA.—This company has awarded a contract to Roberts & Schaefer Company, Chicago, for the erection of a reinforced concrete locomotive coaling plant at the new Toledo, Ohio, terminal.

Railway Financial News

BIRMINGHAM & SOUTHEASTERN.—*Reorganization.*—The Birmingham & Southeastern Railroad has applied to the Interstate Commerce Commission for authority to take over the property of the Birmingham & Southeastern Railway on which a mortgage is to be foreclosed.

CENTRAL OF GEORGIA.—*New Director.*—W. W. Banks, executive manager of the Citizens and Southern Bank, of Atlanta, Ga., has been elected a director to succeed the late George J. Mills, of Savannah.

CHESAPEAKE & OHIO.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue nominally $552,000 of 4½ per cent bonds of 1892 in reimbursement of the cost of constructing second track.

CHICAGO, PEORIA & ST LOUIS.—*Sale in Parcels.*—The Supreme Court of Illinois has granted authority to this railroad to sell its property in parcels overruling the order of the Illinois Commerce Commission which specified that the property must be sold as a whole.

DENVER & RIO GRANDE WESTERN.—*Sold.*—This railroad was sold at public auction in Denver on October 29 to Donald C. Swatland and Hayward A. Hibberd of New York, representatives of the reorganization managers, for $17,935,700, subject to the approval of the United States District Court. The amount was the upset price named by Judge J. Foster Symes, who recently authorized the foreclosure and sale of the property. Before bids were called for, Harold B. Palmer, of New York, a minority bondholder, served notice of protest with statement that in due time the court would be asked to allow him to intervene for purpose of opposing confirmation of sale and asking vacation of decree.

GAINESVILLE MIDLAND.—*Valuation.*—The Interstate Commerce Commission has issued a final valuation report placing the value for rate-making purposes of the property owned and used for common carrier purposes at $1,174,665 as of June 30, 1915.

GREAT NORTHERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Olcott to Fermoy, Minn., 20.5 miles.

MINNEAPOLIS & ST. LOUIS.—*Receiver's Certificates.*—The Interstate Commerce Commission has authorized an issue of $750,000 of 5½ per cent receiver's certificates to fund a like amount maturing on November 1.

Judge Wilbur F. Booth in the Federal Court at Minneapolis on October 27 denied the application of the receiver of the Minneapolis & St. Louis for approval of a $13,000,000 rehabilitation program, including immediate issuance of $7,000,000 in receiver's certificates. Judge Booth's decision was based on a disinclination to put receiver's certificates ahead of present mortgages.

MISSOURI PACIFIC.—*Equipment Trusts.*—Kuhn, Loeb & Co. have purchased, subject to the approval of the Interstate Commerce Commission, $3,900,000 5 per cent equipment trust certificates, series C, maturing in equal amounts in annual instalments from November 1, 1925, to November 1, 1939, both inclusive, which have been distributed privately. These certificates will be secured by new standard equipment costing about $5,212,000, of which 25 per cent in cash is to be paid by the railroad company.

MORGAN'S LOUISIANA & TEXAS RAILROAD & STEAMSHIP COMPANY.—*Acquisition.*—The Interstate Commerce Commission has authorized the acquisition by this company of control of the Franklin & Abbeville by purchase of its capital stock.

NEW ORLEANS, TEXAS & MEXICO.—*Bonds.*—The Interstate Commerce Commission has authorized an issue of $1,770,000 of first mortgage 5½ per cent bonds, to be sold, together with $1,014,000 of additional first mortgage bonds, at not less than 95 for the purpose of retiring equipment trust certificates.

NEW YORK CENTRAL.—*Lease.*—This company has applied to the Interstate Commerce Commission for authority to acquire control by lease of the Hudson River Connecting.

NORFOLK & WESTERN.—*Lease Abandoned.*—President A. C. Needles stated:

"The Pennsylvania Railroad has been unable to make a proposition for a long term lease of the Norfolk & Western property on a financial basis which, in the opinion of the Norfolk & Western directors, would be satisfactory to its stockholders, and all negotiations for such lease have therefore been concluded.

"The conclusion of these negotiations will not affect the friendly relations existing for a long time between the two companies, which have been to their mutual benefit and to the advantage of the territories served by both."

See also Pennsylvania item below.

Dividends.—The Norfolk & Western has declared an extra dividend of 1 per cent and a regular quarterly dividend of 1¼ per cent on the common, both payable December 19 to stock of record November 29. On December 19, 1923, an extra of 1 per cent was declared.

PENNSYLVANIA.—*N. & W. Lease Abandoned.*—President Samuel Rea has made the following statement: "The board of directors of the Pennsylvania Railroad has decided that the company could not negotiate a lease of the Norfolk & Western on a financial basis that would be entirely satisfactory to the owners of the latter company. Therefore, further consideration of a lease has been terminated."

ST. LOUIS-SAN FRANCISCO.—*Acquisition.*—The Interstate Commerce Commission has authorized the acquisition by the Kansas City, Fort Scott & Memphis of control of the Kansas City, Clinton & Springfield, through stock ownership, and also the acquisition by the St. Louis-San Francisco of control of the Kansas City, Clinton & Springfield by lease.

TEXAS PACIFIC-MISSOURI PACIFIC TERMINAL RAILROAD OF NEW ORLEANS.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $5,000,000 of first mortgage 5½ per cent gold bonds, guaranteed by the Texas & Pacific and Missouri Pacific, to be sold at not less than 97½ to provide for some notes at maturity and to reimburse the proprietary company for advances.

TEXAS & PACIFIC.—*Equipment Trusts.*—Kuhn, Loeb & Co. have purchased, subject to the approval of the Interstate Commerce Commission, $3,285,000 5 per cent equipment trust certificates, series GG, maturing in equal amounts in annual instalments from November 1, 1925, to November 1, 1939, both inclusive, which have been distributed privately. These certificates will be secured by new standard equipment costing about $4,395,000, of which 25 per cent in cash is to be paid by the railway company.

WHEELING & LAKE ERIE.—*Tentative Valuation.*—The Interstate Commerce Commission has served a tentative valuation report placing the final value for rate-making purposes of the property owned for common carrier purposes as of June 30, 1918, at $40,285,435 and that of the property used at $40,956,740. The outstanding capitalization as of valuation date was $78,105,514 and the property investment account was $77,759,611. The cost of reproduction new of the property owned, exclusive of land, is reported as $40,994,161 and the cost of reproduction less depreciation as $32,364,687.

Dividends Declared

Georgia, Southern & Florida.—First and second preferred, $2.50, semi-annually, payable November 29 to holders of record November 14.

Illinois Central.—Common, $1.75, quarterly, payable December 1 to holders of record November 7.

Norfolk & Western.—Common, 1¼ per cent, quarterly; extra, 1 per cent; both payable December 19 to holders of record November 29.

Ontario & Quebec.—Common, 3 per cent, payable November 1; debenture stock, 2½ per cent, payable December 1.

Trend of Railway Stock and Bond Prices

	Oct. 28	Last Week	Last Year
Average price of 20 representative railway stocks	70.50	69.89	58.21
Average price of 20 representative railway bonds	88.07	87.87	81.84

Railway Officers

Executive

A. E. Clift, vice-president in charge of operation of the Illinois Central, with headquarters at Chicago, has been elected senior vice-president, with the same headquarters, succeeding C. M. Kittle, who has resigned to become president of Sears, Roebuck & Co. **J. J. Pelley,** general manager, with headquarters at Chicago, has been elected vice-president in charge of operation, with the same headquarters, succeeding Mr. Cliff. **H. B. Hull,** assistant to the president, with headquarters at Chicago, has been elected vice-president, with the same headquarters, a newly created position.

Executive Changes on the Pennsylvania

W. W. Atterbury, vice-president in charge of operation of the Pennsylvania, has been elected vice-president, effective November 15. General Atterbury will assist President Samuel Rea in the discharge of his duties and in the several important improvement projects which the company has in view and will act as president in Mr. Rea's absence. The creation of the new position was made necessary by the approaching retirement of President Rea, which is scheduled for next year. To fill the vacancy caused by General Atterbury's promotion, **Elisha Lee,** regional vice-president at Pittsburgh, has been appointed vice-president in charge of operation. **E. T. Whiter,** regional vice-president at Chicago, will be transferred to Pittsburgh to succeed Mr. Lee. **T. B. Hamilton,** general manager of the Northwestern region at Chicago, has been appointed vice-president of the Northwestern region, to succeed Mr. Whiter, and will also discharge the duties of general manager at Chicago.

W. W. Atterbury

Elisha Lee

E. T. Whiter

T. B. Hamilton

General W. W. Atterbury was born at New Albany, Ind., in 1866. He completed his education at Yale University in 1886. The same year he entered the Pennsylvania's service as an apprentice in the Altoona shops, and later served as assistant road foreman of engines on various divisions, assistant engineer of motive power and master mechanic. In 1896 he became superintendent of motive power of the Pennsylvania, Lines East. In 1910 he became general superintendent of motive power. On January 1, 1903, he was appointed general manager of the Lines East, and on March 24, 1909, was elected fifth vice-president in charge of transportation. He became fourth vice-president on March 3, 1911, and at the same time was elected a director of the Pennsylvania Railroad Company. On May 8, 1912, he was elected vice-president in charge of operation of the Lines East of Pittsburgh. From August, 1917, to May, 1919, he was director-general of transportation of the American Expeditionary Forces in France, with the rank of brigadier-general, and in that connection had charge of the details of organization for the construction and operation of the American transportation requirements, as well as harmonizing them with those of the allies. Since the return of the railroads to their owners upon the termination of federal control, General Atterbury has been vice-president in charge of operation of the entire Pennsylvania System.

Elisha Lee was born in 1870 at Chicago. He was graduated from the Massachusetts Institute of Technology in 1892 and in that year entered Pennsylvania service as rodman on the Tyrone division. He was afterward assistant supervisor, assistant engineer in the maintenance of way department, and principal assistant engineer of the Philadelphia, Baltimore & Washington. In 1909 he became superintendent of the New York, Philadelphia & Norfolk, and in 1911 was made assistant to the general manager of the Pennsylvania, Lines East. He became general superintendent of the Philadelphia, Baltimore & Washington on April 1, 1914. On May 1, 1916, Mr. Lee became assistant general manager, and on April 1, 1917, general manager of the Pennsylvania, Lines East. Following the departure of General Atterbury for France, Mr. Lee, for a time, was acting vice-president in charge of operation. From June 1, 1918, to the termination of federal control, Mr. Lee was federal manager of the Pennsylvania, Lines East. Upon the restoration of the railroads to their owners, Mr. Lee became vice-president in charge of the Eastern region, with headquarters at Philadelphia. Since October 24, 1923, he has been vice-president in charge of the Central region, with headquarters at Pittsburgh.

Edward T. Whiter, was born at Steubenville, Ohio, in 1864, and was educated in the public schools. He entered the employ of the "Pan-Handle" Railway as telegraph operator in 1881, and later became train dispatcher, assistant trainmaster and trainmaster of various divisions. He became superintendent of the Eastern division of the Pennsylvania in 1903, and in 1913 was made general superintendent of the then existing Northwest system, Pennsylvania Lines, West. On July 1, 1915, he became assistant general manager of the Pennsylvania, Lines West, and on March 1, 1920, was appointed assistant to the vice-president in charge of personnel, Pennsylvania System, with headquarters at Philadelphia. Since April 16, 1923, Mr. Whiter has been vice-president in Charge of the Northwestern region.

T. B. Hamilton was born in 1865 at Columbus, Ohio, and was graduated from Princeton Universtiy in 1888. In that year he entered the railroad's employ as a rodman on the Louisville division, and was subsequently on the engineering corps, assistant engineer and engineer of maintenance of way on various divisions. He became superintendent of the Erie & Ashtabula division in 1901, and of the Cleveland & Pittsburgh division in 1903. In 1912 he was made general superintendent of the then existing Central system, Pennsylvania Lines West, and on February 1, 1914, he became general manager of the Vandalia Railroad. When the latter was merged with the "Pan-Handle" Mr. Hamilton was elected resident vice-president of the Pennsylvania System at St. Louis. Since the termination of Federal control Mr. Hamilton has been general manager of the Northwestern region.

C. M. Kittle, senior vice-president of the Illinois Central and the Yazoo & Mississippi Valley, with headquarters at Chicago, has resigned to become president of Sears, Roebuck & Co., Chicago. Mr. Kittle was born on October 9, 1880, at Elkins, W. Va., and entered railway service in April, 1895, as a clerk on the West Virginia Central & Pittsburgh, now a part of the Western Maryland. He was later employed in station and yard service on the Atlantic Coast Line and the Baltimore & Ohio. He entered the service of the Illinois Central in October, 1900, in the engineering department. From 1901 to October, 1910, Mr. Kittle held various positions in the maintenance of way, mechanical, transportation and accounting departments, on the latter date being promoted to general freight claim agent of both the Illinois Central and the Yazoo & Mississippi Valley. He was promoted to assistant to the president in July, 1912, and served in that position until November, 1916, when he was elected vice-president. During the period of federal control, Mr. Kittle served as federal manager of the Illinois Central, the Yazoo & Mississippi Valley and the Gulf & Ship Island. He was elected senior vice-president on March 1, 1920, and remained in that position until his recent resignation.

C. M. Kittle

Financial, Legal and Accounting

S. W. Thornton has been appointed secretary and treasurer of the Hartwell Railway and **L. N. Adams** has been appointed auditor, both with headquarters at Hartwell, Ga.

W. D. McCaig, assistant comptroller of the Atlantic Coast Line, with headquarters at Wilmington, N. C., has been elected comptroller, with the same headquarters, succeeding H. C. Prince, deceased.

R. H. Tschudy has been appointed treasurer and general manager of the Cairo, Truman & Southern, with headquarters at Kansas City, Mo. **Fred Tschudy** has been appointed secretary and traffic manager and **O. W. Pratt** has been appointed general counsel, both with headquarters at Kansas City.

Operating

J. B. Jones has been appointed superintendent of the Hartwell Railway, with headquarters at Hartwell, Ga.

C. S. Cannon has been appointed assistant superintendent of the Florida division of the Seaboard Air Line, with headquarters at Tampa, Fla., **R. P. Jourdan** and **Walker Wilson** have been appointed assistant trainmasters of the Florida division. **C. D. Boyd,** chief dispatcher at Charleston, S. C., has been promoted to assistant trainmaster of the South Carolina division, with headquarters at Savannah, Ga. **J. A. McLees** has been appointed chief dispatcher of the East Carolina division, with headquarters at Charleston, succeeding Mr. Boyd.

F. W. Everett, superintendent of the New York Central at Syracuse, N. Y., has been promoted to assistant to the general superintendent, with the same headquarters. **F. S. Risley,** superintendent at Buffalo, N. Y., has been transferred to the Syracuse division, with headquarters at Syracuse, succeeding Mr. Everett. **M. E. Welch,** superintendent at Oswego, N. Y., has been transferred to the Buffalo division, with headquarters at Buffalo, succeeding Mr. Risley. **W. A. Hamler,** assistant superintendent at Jersey Shore, Pa., has been promoted to superintendent of the Ontario division, with headquarters at Oswego, succeeding Mr. Welsh. **H. Scott,** superintendent at Corning, N. Y., has been transferred to the Mohawk division, with headquarters at Albany, N. Y. **D. L. Sommerville,** superintendent at Rochester, N. Y., has been transferred to the Pennsylvania division, with headquarters at Corning, succeeding Mr. Scott. **G. D. Dager,** superintendent at Utica, N. Y., has been transferred to the Rochester division, with headquarters at Rochester, succeeding Mr. Sommerville. **D. T. Hanna,** assistant superintendent at New York, has been promoted to superintendent of the Adirondack division, with headquarters at Utica, succeeding Mr. Dager.

G. E. Patterson, general superintendent of the Northern lines of Illinois Central, with headquarters at Chicago, has been promoted to general manager, with the same headquarters, succeeding **J. J. Pelley,** who has been elected vice-president in charge of operation. **W. Atwill,** general superintendent of the Southern lines, with headquarters at New Orleans, La., has been transferred to the Northern lines, with headquarters at Chicago, succeeding Mr. Patterson. **J. W. Hevron,** superintendent of the St. Louis division, with headquarters at Carbondale, Ill., has been promoted to general superintendent of the Southern lines, with headquarters at New Orleans, succeeding Mr. Atwill. **C. R. Young,** superintendent of the Tennessee division, with headquarters at Fulton, Ky., has been transferred to the St. Louis division succeeding Mr. Hevron. **W. H. Williams,** trainmaster of the Fulton and Hickman districts, with headquarters at Fulton, Ky., has been promoted to superintendent of the Tennessee division, with the same headquarters, succeeding Mr. Young. **E. L. McLaurine,** trainmaster of the McComb district, with headquarters at McComb, Miss., has been transferred to the Fulton and Hickman districts, with headquarters at Fulton, succeeding Mr. Williams. **T. K. Williams,** chief dispatcher, with headquarters at Fulton, has been promoted to trainmaster of the McComb district, with headquarters at McComb, succeeding Mr. McLaurine.

A. D. Shelton, general superintendent of the Northern district of the Southern, Lines East, with headquarters at Danville, Va., has been granted leave of absence to recover his health. **W. C. Hudson,** general superintendent of the Eastern district at Charlotte, N. C., has been transferred to the Northern district, with headquarters at Danville, to succeed Mr. Shelton. **J. W. Wassum,** general superintendent, Lines West, with headquarters at Macon, Ga., has been transferred to the Eastern district, Lines East, with headquarters at Charlotte, succeeding Mr. Hudson. **C. Chandler,** superintendent of the Cincinnati, New Orleans & Texas Pacific, with headquarters at Somerset, Ky., has been appointed acting general superintendent of the Southeastern district, with headquarters at Macon, succeeding Mr. Wassum. **L. H. Woodall,** superintendent of the Memphis division, with headquarters at Sheffield, Ala., has been appointed superintendent of the Cincinnati, New Orleans & Texas Pacific, with headquarters at Somerset, succeeding Mr. Chandler. **J. W. Payne,** trainmaster of the Memphis division, has been promoted to superintendent of the Memphis division, with headquarters at Sheffield, succeeding Mr. Woodall. **W. P. Webb,** trainmaster of the Birmingham division, has been transferred to the Memphis division, succeeding Mr. Payne. **J. N. Winston,** trainmaster of the Alabama Great Southern, has been transferred to the Birmingham division, succeeding Mr. Webb. **T. O. Crane,** trainmaster of the Mobile division, has been transferred to the Alabama Great Southern, succeeding Mr. Winston. **Lawrence Ennis,** trainmaster of the Memphis division, has been transferred to the Mobile division, succeeding Mr. Crane. **S. C. Cherry,** assistant trainmaster of the Cincinnati, New Orleans & Texas Pacific, has been promoted to trainmaster of the Memphis division, succeeding Mr. Innis.

Traffic

C. Atkinson has been appointed commercial agent for the Kansas, Oklahoma & Gulf, with headquarters at St. Louis, Mo.

J. J. Murtaugh has been appointed commercial agent of the Chicago, Rock Island & Pacific, with headquarters at Alexandria, La.

J. G. Delaplaine, general agent of the passenger department of the Chicago, Burlington & Quincy, with headquarters at St. Louis, Mo., has been appointed manager of the newly established tour bureau of the Chicago, Burlington & Quincy, the Northern Pacific and the Great Northern, with headquarters at Chicago.

Mechanical

B. G. Pauley has been appointed master mechanic of the Omaha division of the Chicago, Burlington & Quincy, with headquarters at Omaha, Nebr.

Engineering, Maintenance of Way and Signaling

R. E. Dougherty, designing engineer of the New York Central, with headquarters at New York, has been promoted to the staff of the vice-president with the title of special engineer, with the same headquarters. **W. C. Maurice** has been appointed assistant engineer, with headquarters at Albany, N. Y., succeeding **J. G. Brennan** who has been promoted engineer of grade crossings with headquarters at New York to succeed **G. A. Noren** promoted to designing engineer succeeding Mr. Dougherty.

J. E. Saunders, formerly for some time assistant signal engineer of the Delaware, Lackawanna & Western, but for the past ten years with the Union Switch & Signal Company, has resigned the latter position, and has been appointed signal engineer of the Lackawanna in place of M. E. Smith, who retired at the end of October; headquarters, Hoboken, N. J. Mr. Saunders was born at Nickerson, Kan., in 1884, and was educated at the Armour Institute of Technology where he was graduated in 1907 in the electrical engineering course. Before this he had served on the Atchison, Topeka & Santa Fe, in vacations, as a clerk and as a chairman and later as batteryman and with the construction forces of the signal department. After graduation he was inspector of mechanical locking on the Illinois Central for a short time and then returned to the Santa Fe as chief draftsman on the Coast Lines. For three years he was assistant signal engineer of the Santa Fe System, whence he went to the Lackawanna, as before stated. He went to the Union Switch & Signal Company in 1914 as electrical engineer and later rose to the position of assistant chief engineer. For six months during the war he served under the president of the Union Switch & Signal Company on the production of light artillery. After the war he was for a time Canadian Representative, and in 1923 went to South America where the Union company installed signals on the Chilean State Railroad. **Milton E. Smith** was born in 1865 at Goldsboro, Md., and entered railroad service on the Pennsylvania in 1882. He was with the Erie for 10 years and the New York Central for 5 years before going to the Lackawanna in 1900. He has been signal engineer since 1903.

J. E. Saunders

Vance Sykes, division engineer of the Seaboard Air Line, with headquarters at Hamlet, N. C., has been promoted to district engineer maintenance of way of the Northern district, with the same headquarters. **W. D. Simpson,** division engineer at Tampa, Fla., has been promoted to district engineer maintenance of way of the Southern district, with headquarters at Jacksonville, Fla. **O. F. McNairy,** division engineer at Jacksonville, has been transferred to the North Carolina division, with headquarters at Hamlet, succeeding Mr. Sykes. **C. A. Henderson** has been appointed division engineer of the South Carolina division, with headquarters at Jacksonville, succeeding Mr. McNairy. **C. M. Cannon,** division engineer at Savannah, Ga., has been transferred to the Florida division, with headquarters at Tampa, succeeding Mr. Simpson. **R. L. Tatem** has been appointed division engineer of the Alabama division, with headquarters at Savannah, succeeding Mr. Cannon.

Obituary

Clifford Milburn Holland, chief engineer in charge of the construction of the Hudson river vehicular tunnel between New York City and Jersey City, died on October 27 in Battle Creek, Mich. Mr. Holland was an authority on the building of under water tunnels. He was born in March, 1883. He received the degree of bachelor of science from Harvard University in 1906 and ever since that time had been interested in the construction of tunnels. He suffered a nervous breakdown three weeks ago and went to Battle Creek for a rest, having been granted a leave of absence for one month by the Tunnel Commission.

A. W. Johnston, formerly assistant to the president of the New York, Chicago & St. Louis, and president of the American Railway Engineering Association in 1907, died on September 8. Mr. Johnston was born on March 4, 1853, at Boston, Mass., and graduated from the Massachusetts Institute of Technology in 1875. He entered railway service in July of that year as a clerk and draftsman in the office of the general superintendent of the Pittsburgh, Cincinnati & St. Louis, now a part of the Pennsylvania. He was promoted to assistant engineer in December, 1878, and held that position until March, 1880, when he was appointed superintendent on the St. Louis-Southwestern. Mr. Johnston was appointed chief engineer of the Toledo, Delphos & Burlington in January, 1882, and in April of that year was appointed superintendent of the Leavenworth, Topeka & Southwestern. He entered the service of the New York, Chicago & St. Louis in January, 1889, as superintendent of the Eastern division and in October, 1893, was promoted to general superintendent. He served in that position until February 1, 1906, when he was promoted to general manager. He was later promoted to assistant to the president and served in that capacity until his retirement on January 1, 1918.

Frederick S. Gallagher, engineer of rolling stock of the New York Central, with headquarters at New York, died on October 26 at St. Lukes hospital, Yonkers, N. Y., from complications. Mr. Gallagher was born on August 1, 1871, at Tecumseh, Mich., and received a common school education at Plattsmouth, Nebr. He entered the service of the New York Central on September 17, 1900, as a draftsman in the office of the mechanical engineer at Collinwood, Ohio. Four years later he left the service of the New York Central, returning in 1906 to his former position. On October 1, 1905, he became chief draftsmen in the office of the assistant engineer of motive power at Collinwood and in 1911 he was appointed assistant engineer in the office of the general mechanical engineer at Grand Central terminal, New York. He was promoted to assistant engineer of rolling stock and motive power on July 1, 1917, and on June 1, 1920, he was promoted to engineer of rolling stock, which position he held at the time of his death.

F. S. Gallagher